Status Updates

VTR (v5.8 / 4.12) – SPAWAR Reviews

v5.8 vs. v5.6 (accumulative error)
Vicals (MODIS, VIIRS, GOCI)
Matchups @ MOBY, WAVCIS (MODIS, VIIRS)
Matchups @ IEODO (GOCI) w/ MODIS and VIIRS if available, If not time series at IEODO site.
Image Comparisons (VIIRS, MODIS, GOCI) v4.12
Matchups (VIIRS, MODIS) – NOAA CalVal, GeoCape and Ocean Color Cruises v4.12
Highres VIIRS (Ryan's Paper)
Sensor Merge
NASA 2014 Updates v4.12 and other changes since v4.10 (List)
Changes from v5.4 to v5.8 (aops v4.10 to v4.12) – List
VIIRS overlap fixes using flags for Daily/Composites (ATMWARN, HISATZEN, ETC.)
LMI Fixes (Coefficient Changes)
VIIRS SDR Calibration Changes LUT and c0 quadratic eq. ...

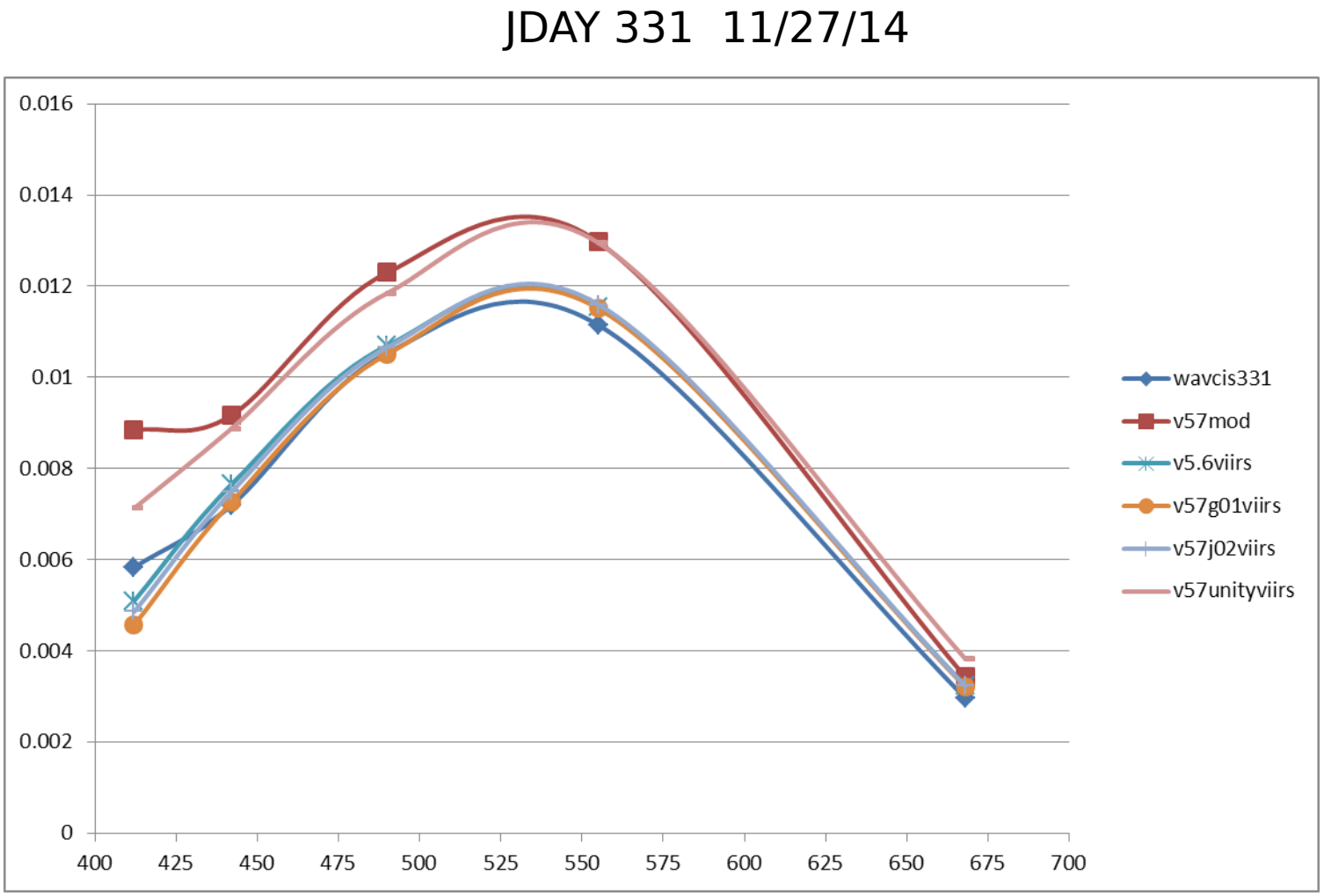
ToDo:

HighRes VIIRS v5.8 – currently testing and integrated
Process NOAA CalVal Cruise Data (ASD, Flowthru – bb,a,c,ag,temp,sal,fluor, Hyperpro)
NexSat VIIRS NRT for Monterey/JPSS program (chlor, SST, IOP's)

Note: MOBY mooring swap out (deployment m257) January 13-15, 2015. Expect a 2 week outage for QC.

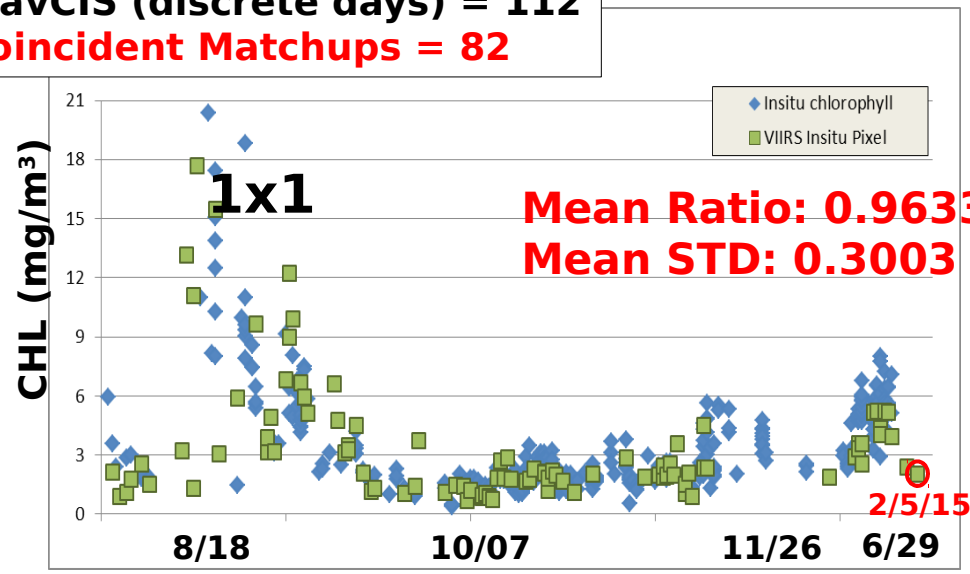
LMI Issues – Fixed (Following Slides)

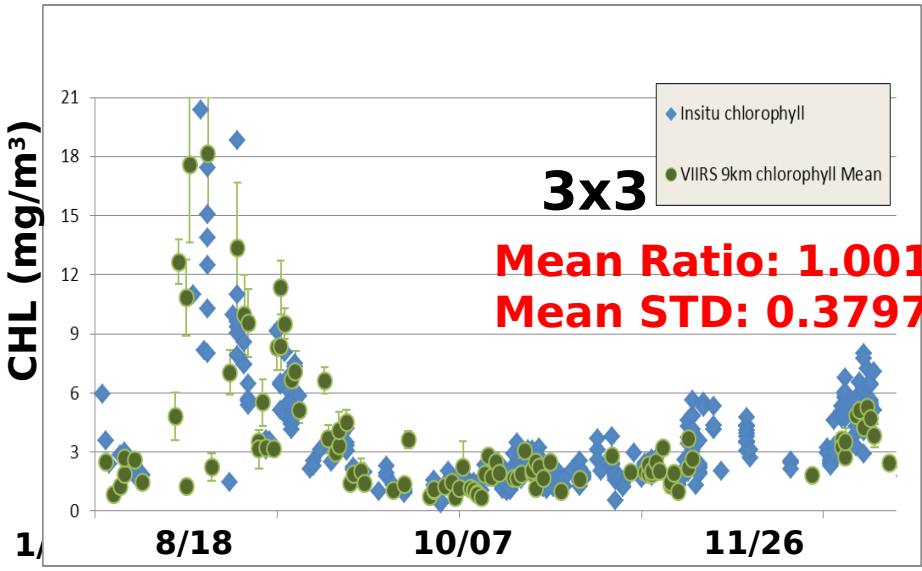
WavCis Matchup

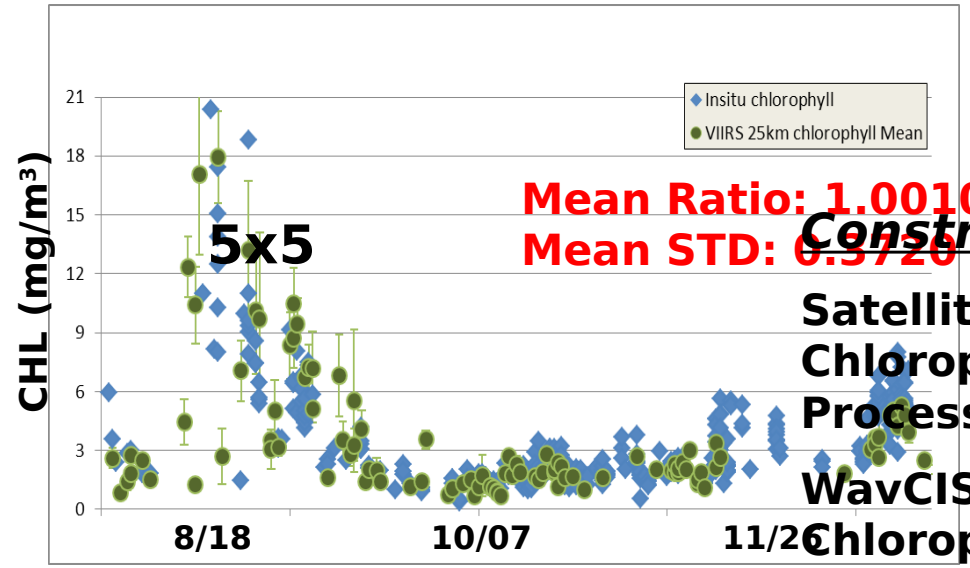


WAVCIS (CSI06) SeaPrism Updates Chlorophyll Matchups

irs n (w/overlap) = 109
irs n (discrete days) = 90
avCIS total = 482
avCIS (discrete days) = 112
incident Matchups = 82







Note: 100% of all available Aeronet data has been obtained. Outage (12/10/14 – 12/30/14) in VIIRS due to download /disk issue. Currently filling gaps/reprocessing with new version of APS.

Constraints:

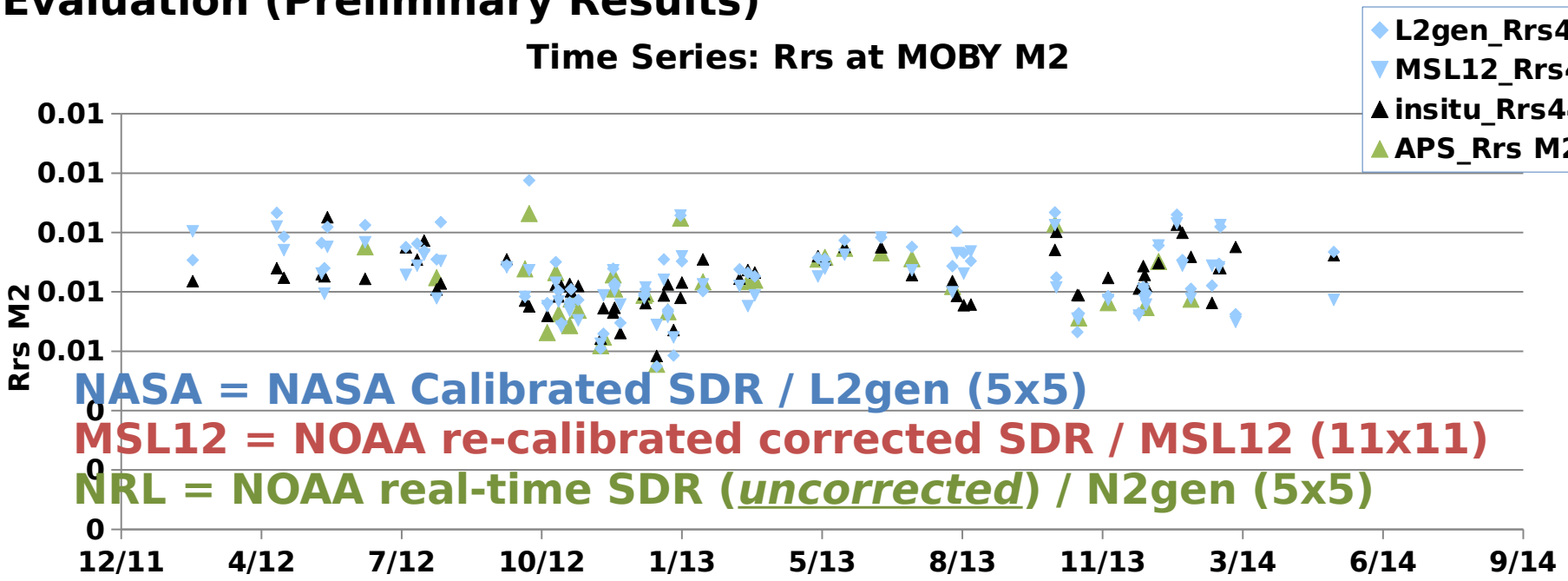
Satellite – Negative Values/Standard Flags, 50%

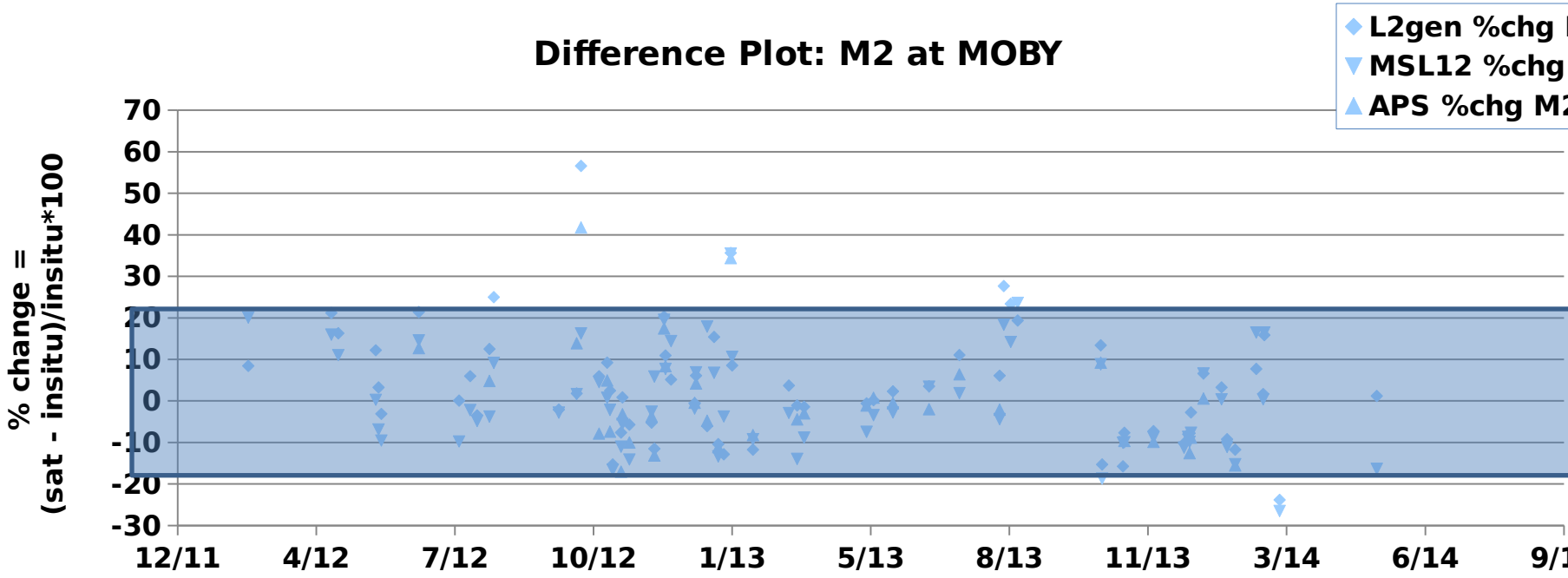
Chlorophyll derived using NRL's Automated Processing System (n2gen/l2gen)

WavCIS – AOT>0.2; Wind speed> 8m/s.

Chlorophyll derived using Aeronet band ratios.

y Evaluation (Preliminary Results)





Because equivalent filtering isn't applied, these stats can only be interpreted generally.

The Time/Date composition of the records used by these 3 techniques is not equivalent, it simply summarizes "data that is available" from each site.

Preliminary Resul

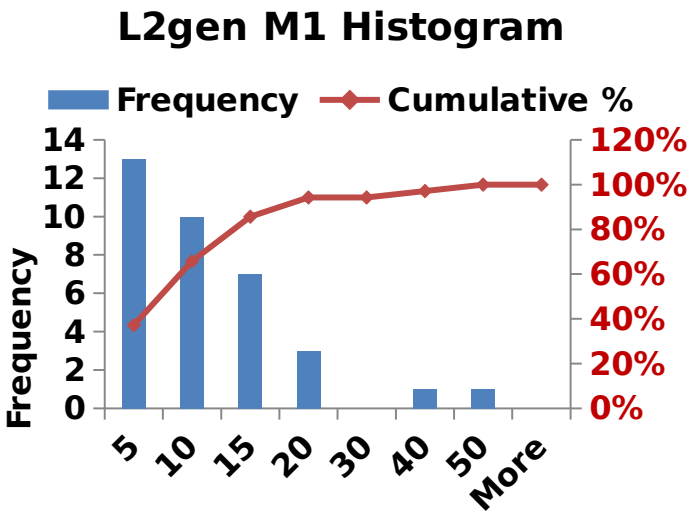
NASA L2gen			NOAA MSL12		NRL APS	
Channel	**Ratio-avg**	**Ratio-std**	**Ratio-avg**	**Ratio-std**	Ratio-avg	Ratio-std
410 nm	1.0023	0.1170	1.043	.1262	0.9925	0.1343
			1.004	.1070	1.0013	0.1271
443 nm	1.0234	0.1164	1.001	.9538	1.0008	0.1188
			.9466	.1855	0.9305	0.2092
486 nm	1.0170	0.1113	1.153	.6040	0.7444	0.5787
551 nm	1.0300	0.2097				
			.8924	.3059	N/A	N/A
671 nm	1.1764	0.6362	73	*unknown time interval	166	June 1, 2012 – Dec 31, 2014
Chl	N/A	N/A				
N =	122	Jan 1, 2012 – May 5, 2014				

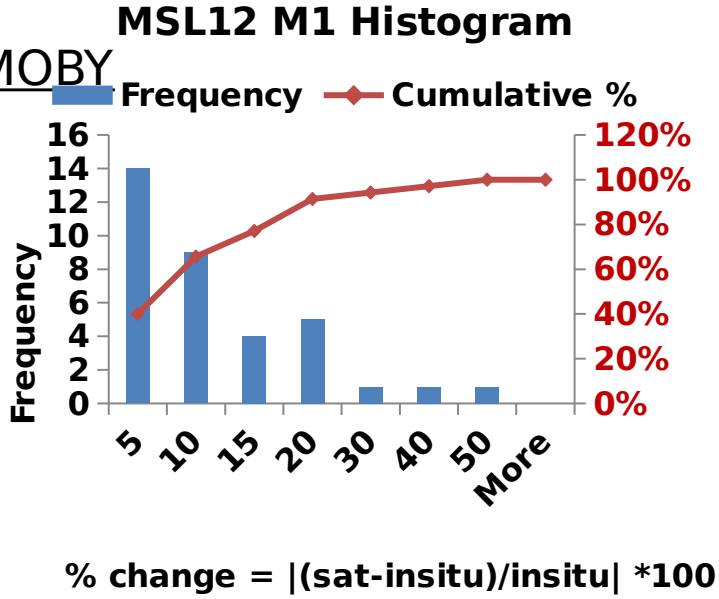
Slides that follow are a 2 way matchup between NOAA and NASA processing based on satellite date.

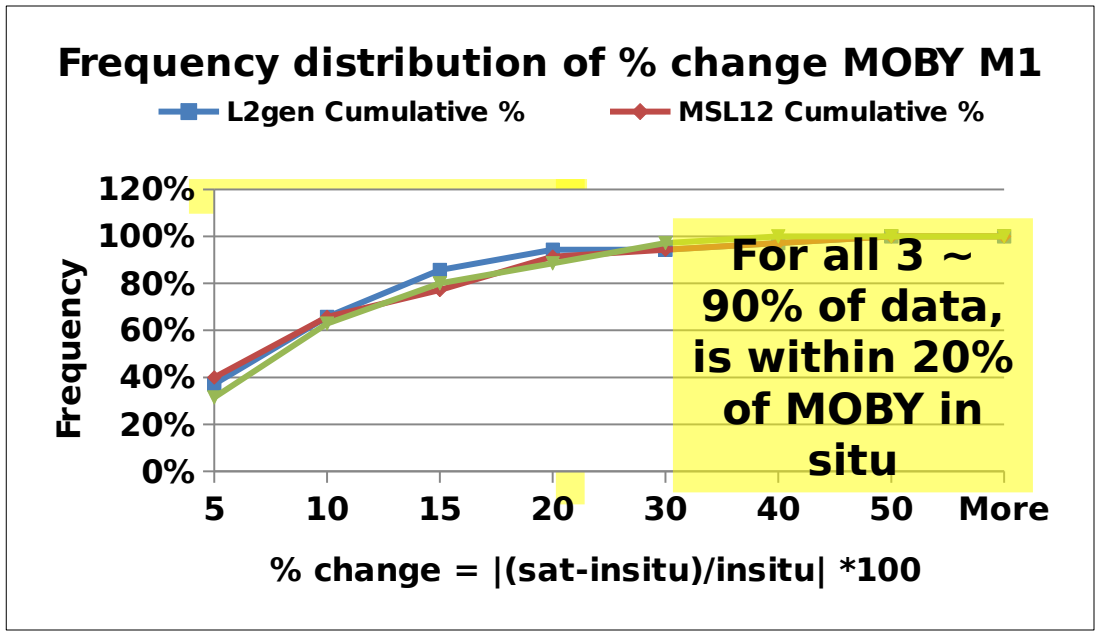
NOAA nLw is pulled from their website based on date corresponding to a NASA data record.

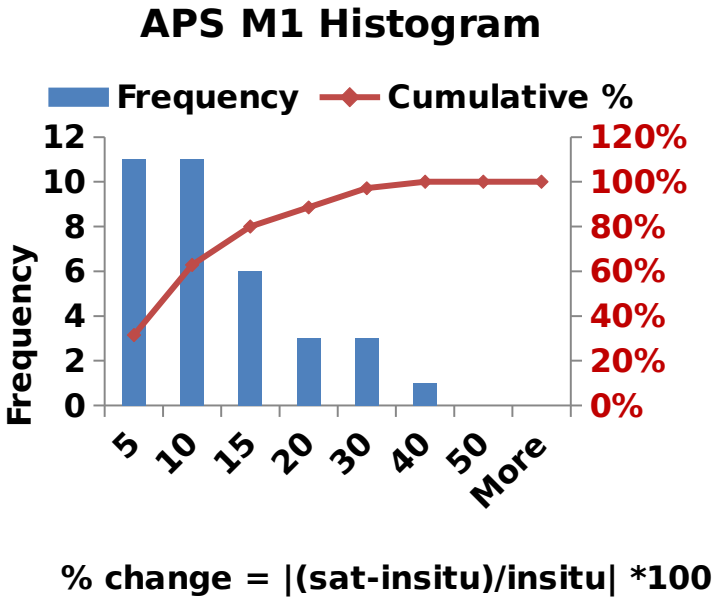
NOTE: NRL using SDR's that have not been reprocessed/corrected. No deviation from other methods. Compare well.

M1 Error Analysis – calculate % change from MOBY

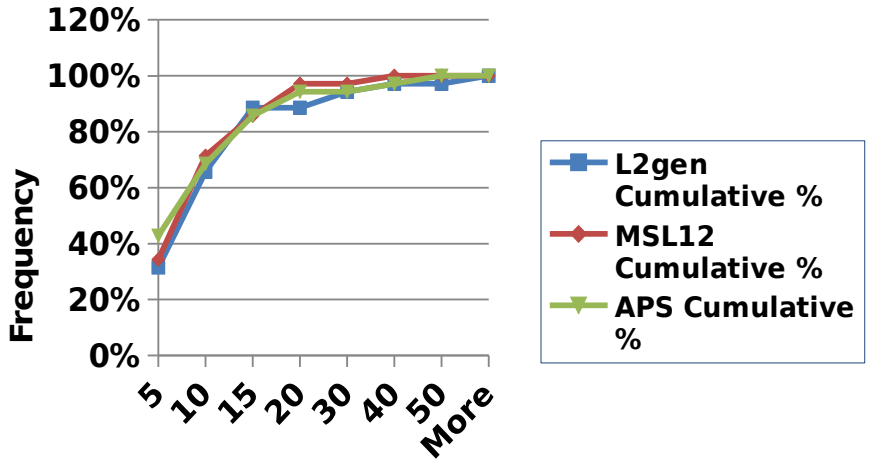






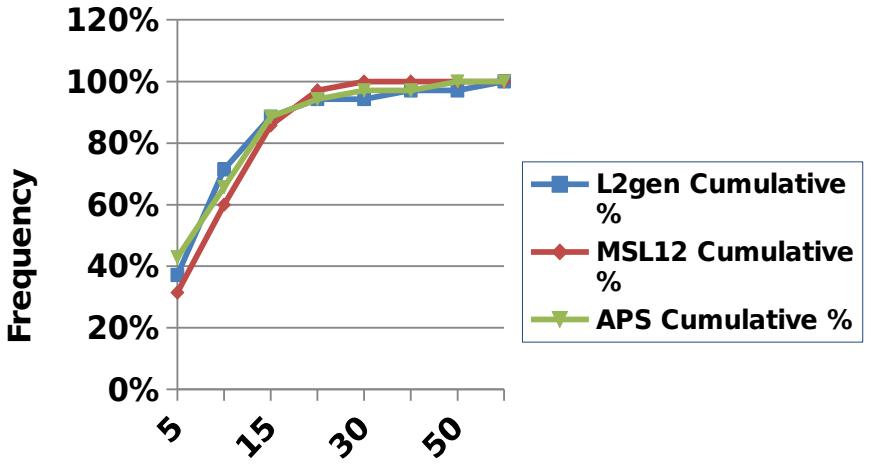


Frequency Distribution of % change MOBY M2



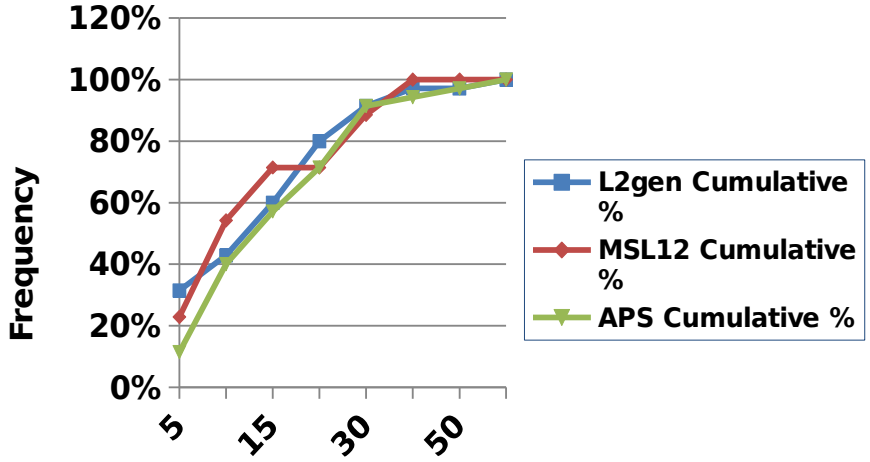
% change = |(sat-insitu)/insitu| *100

Frequency Distribution of % change MOBY M3



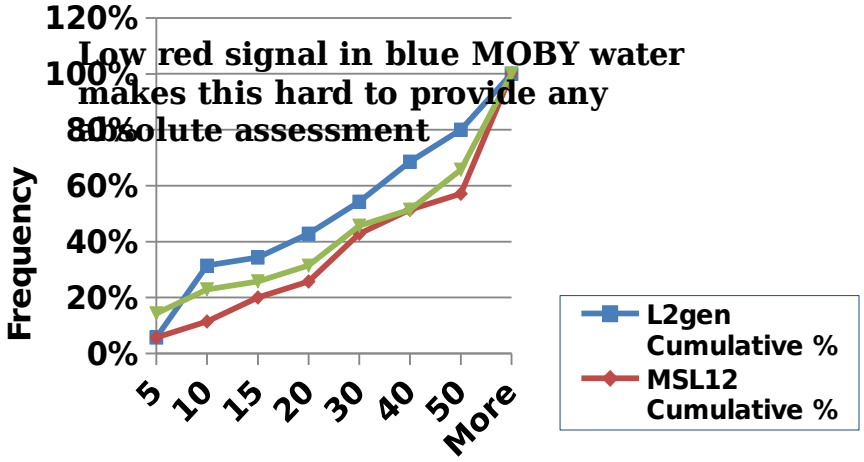
% change = |(sat-insitu)/insitu| *100

Frequency Dsitribution of % change MOBY M4



% change = |(sat-insitu)/insitu| *100

Frequency Distribution of % change MOBY M5



Low red signal in blue MOBY water makes this hard to provide any absolute assessment

% change = |(sat-insitu)/insitu| *100

Preliminary Results

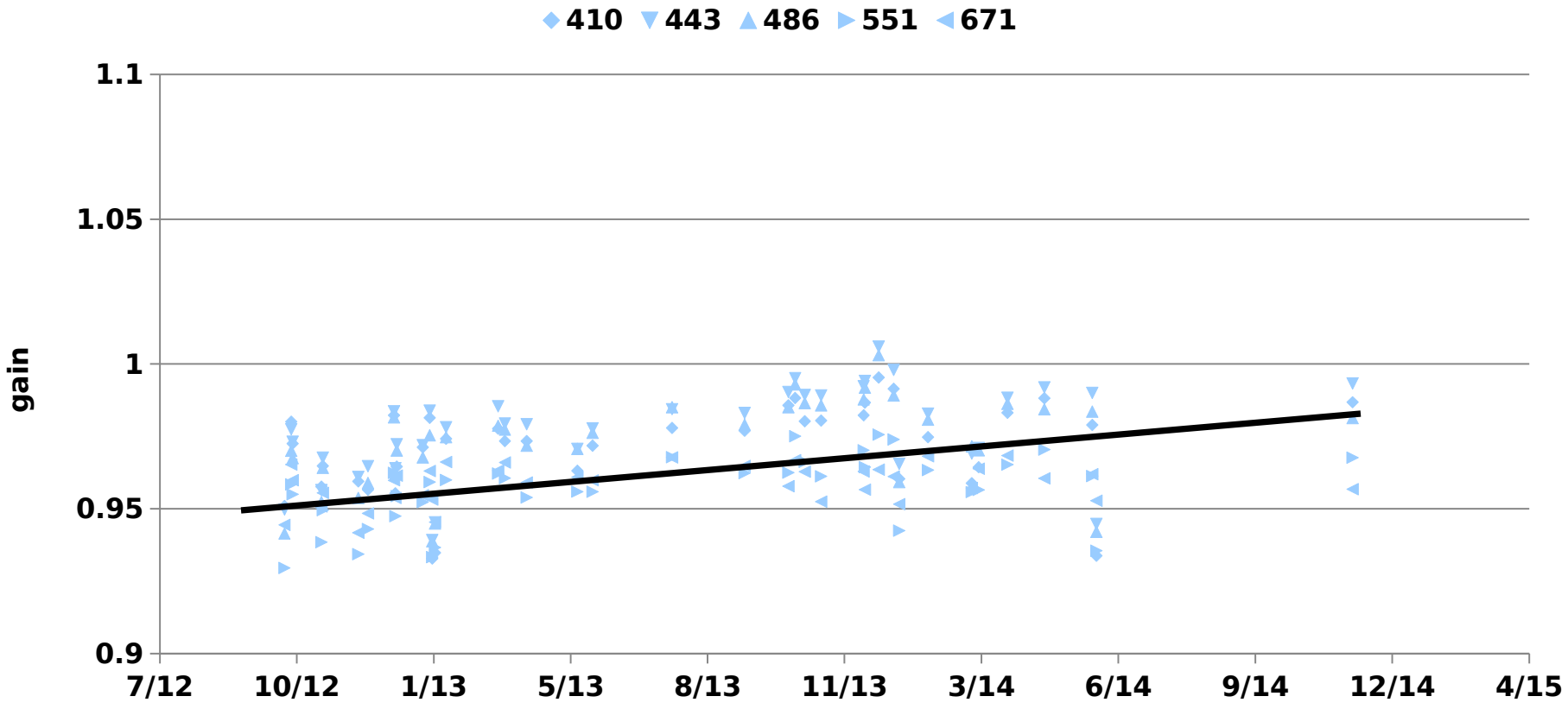
These have been forced to equivalence by Time Date selection from the satellite file.

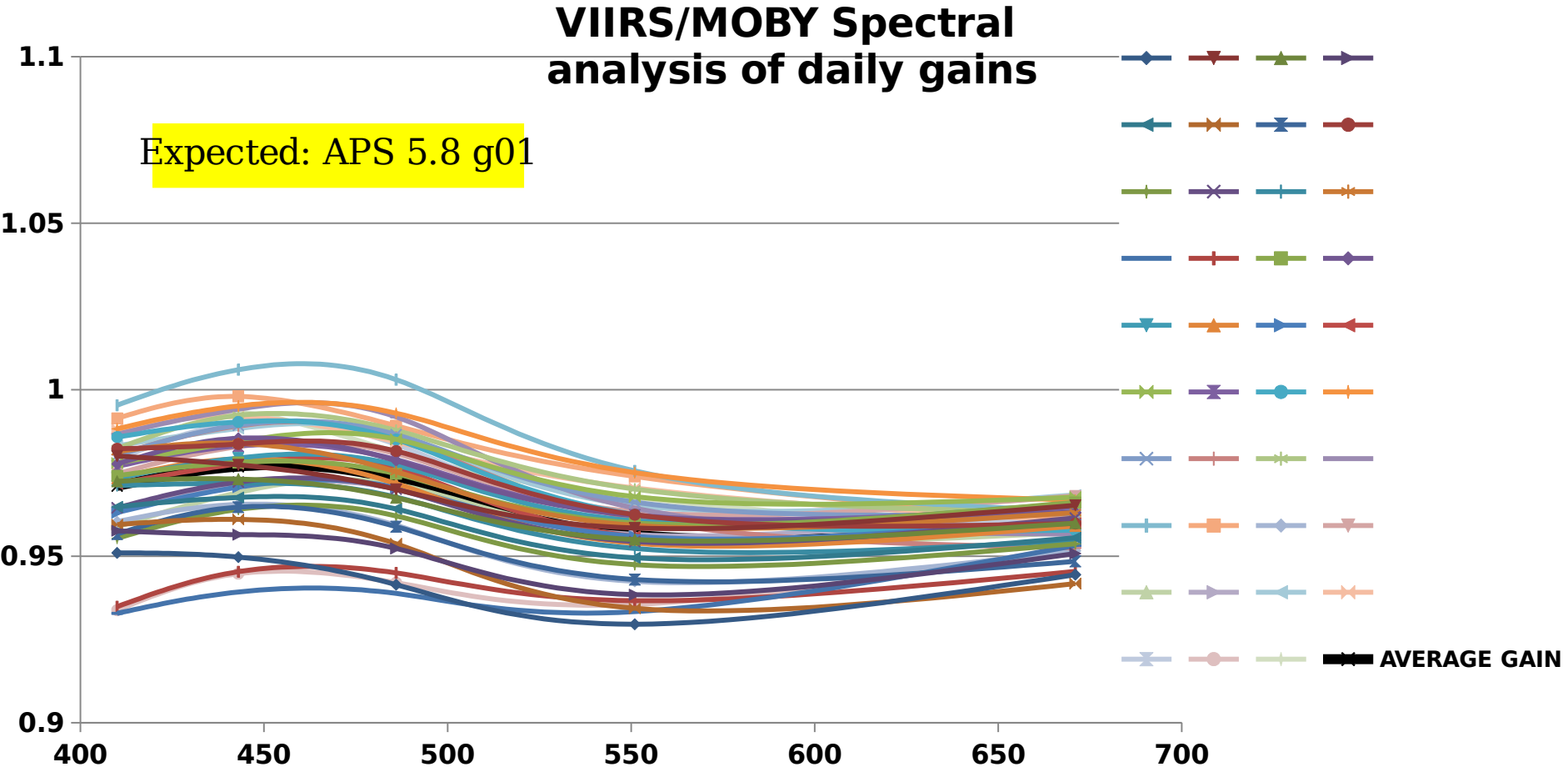
NASA L2gen			NOAA MSL12		NRL APS	
Channel	**Ratio-avg**	**Ratio-std**	**Ratio-avg**	**Ratio-std**	Ratio-avg	Ratio-std
410 nm	1.0171	0.1355	1.0525	0.1276	0.9698	0.1247
443 nm	1.0365	0.1391	0.9989	0.1126	1.0009	0.1269
486 nm	1.0263	0.1365	0.9703	0.1033	0.9904	0.1258
551 nm	1.0403	0.2544	1.0460	0.1592	1.0158	0.2314
671 nm	1.2400	0.7326	1.3702	0.5000	0.9031	0.5790
NRL =	35		35		35	

Summary:

- The comparisons are similar and good (MOBY Gold Q2 Matchups – Not identical to NRL's stand alone work – matchups, vicals, etc.)
- NRL uses nLw35 and closest in time, high quality, RT MOBY
- Seems APS producing better results in green waters using errant SDR's (2012 – present). Still working on finalizing plots.

RS vical run for APS v 5.8/AOPS v4.12 using Unity Gai
MOBY May 20, 2012 to Nov 30, 2014
SDR Calibration Improving over time (Trending towa

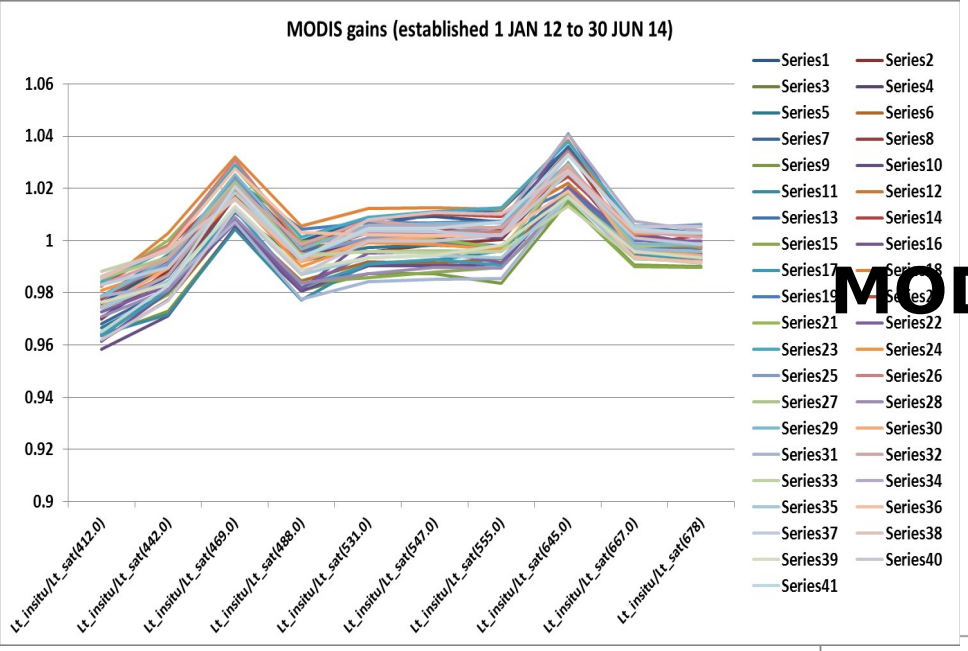


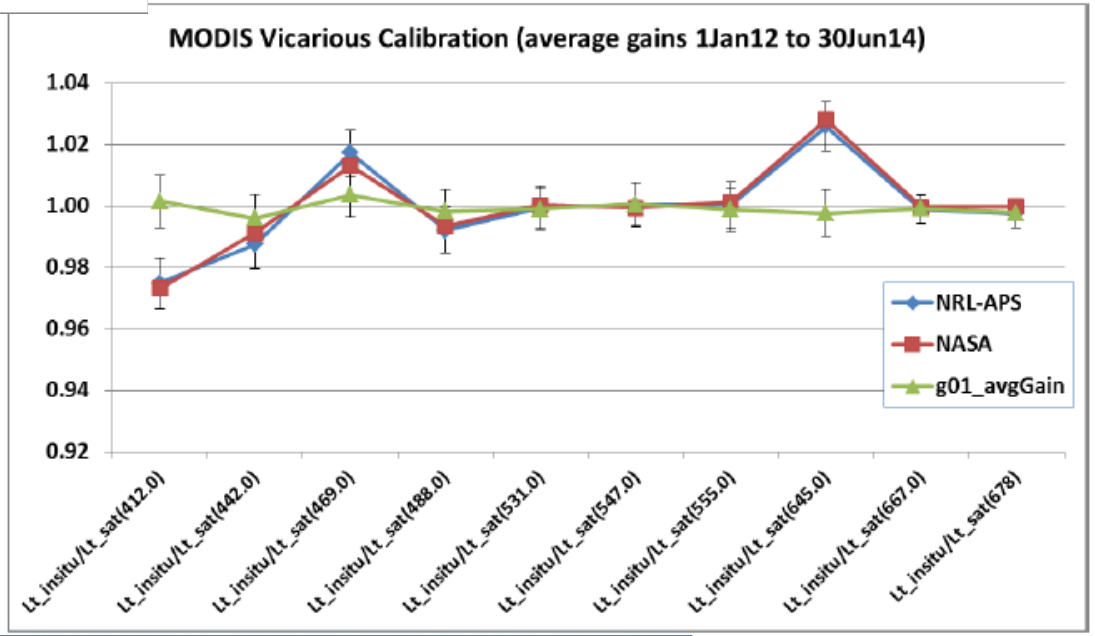


I have a little concern about the lowest four records from M1/M2, but I looked at the in situ data, and ViCal constituents: Lw, etc… based on everything it looks like they just set the lowest limit… unless there is a different reason for each anomaly… La is high for series 1 and 14… Series 38 has a high Lw…

	M1	M2	M3	M4	M5
AVERAGE GAIN	0.9711	0.9769	0.9729	0.9564	0.9587
AVERAGE STDEV	0.0155	0.0157	0.0153	0.0121	0.0067
N	39	39	39	39	39

MODIS-Aqua Vicarious Calibrat
Jan 2012 – June 2014

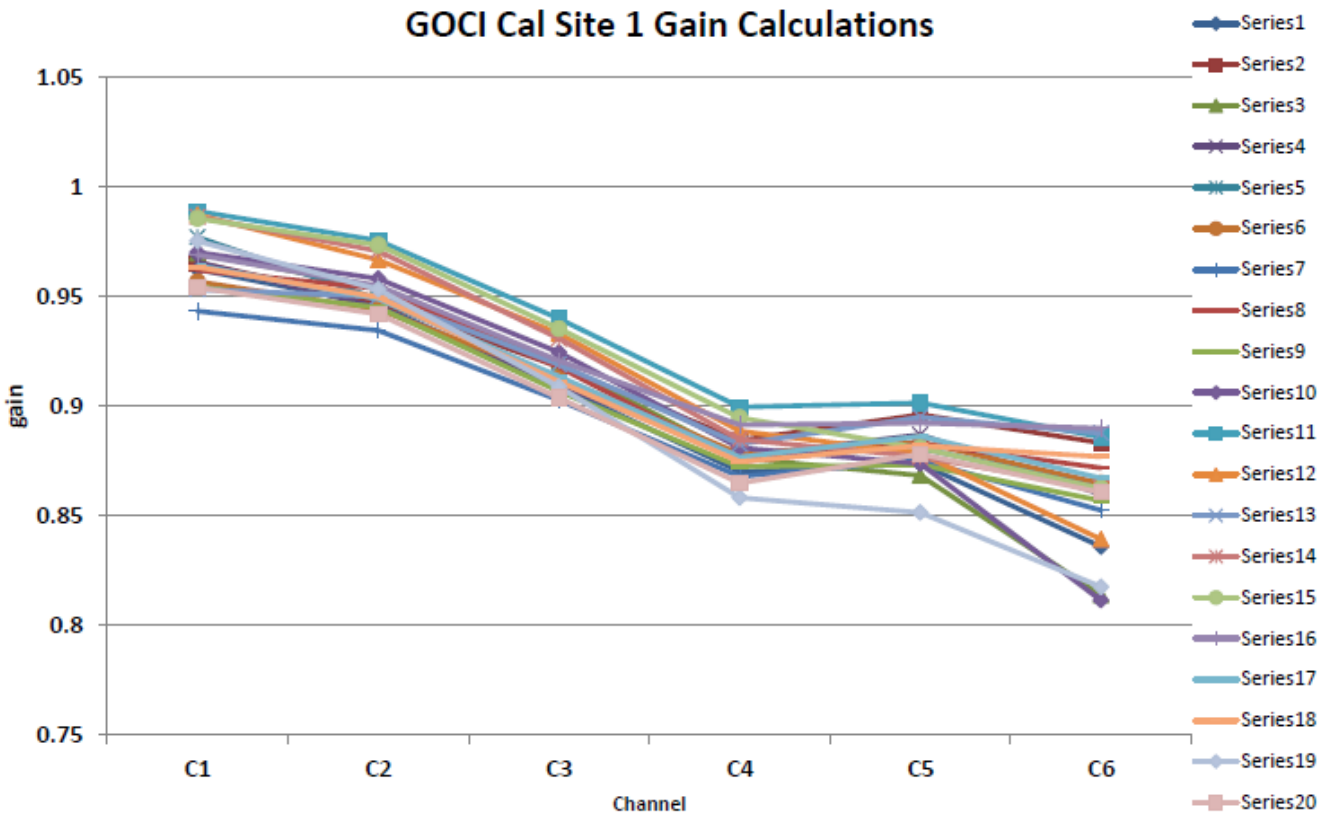




	412 nm	442 nm	469 nm	488 nm	531 nm	547 nm	555 nm	645 nm	667 nm	678 nm
gain	0.9748	0.9875	1.0173	0.9921	0.9995	1.0003	1.0003	1.0259	0.9988	0.9975
stdev	0.0083	0.0079	0.0075	0.0074	0.0071	0.0071	0.0074	0.0080	0.0045	0.0046

GOCI to MODIS Vicarious Calibration
March 2013 – March 2014

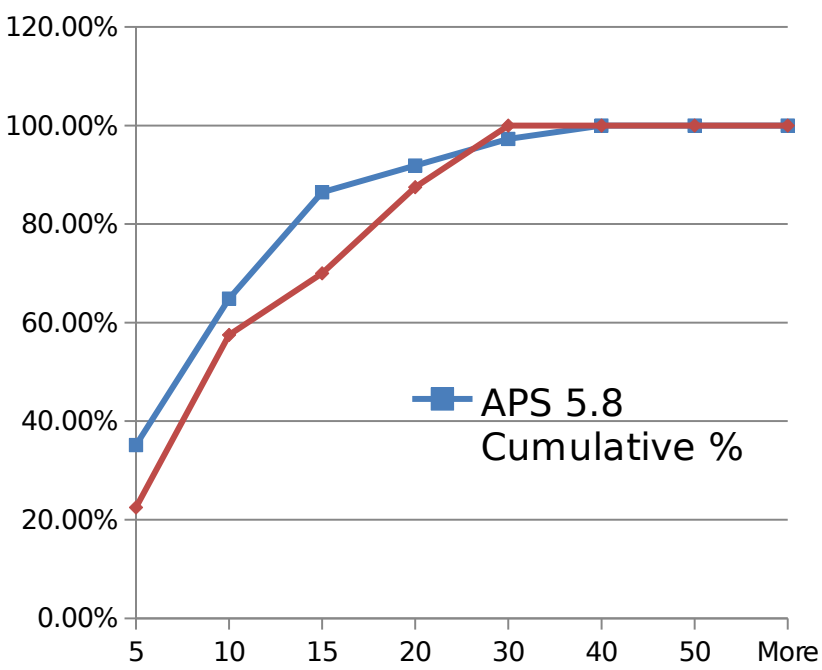
	412	443	490	555	660	680	745	865
v5.6	0.9676	0.9530	0.9173	0.8786	0.8807	0.8580	0.9430	1.0000
v5.4	0.9862	0.9753	0.9473	0.9149	0.9245	0.9223	0.9430	1.0000



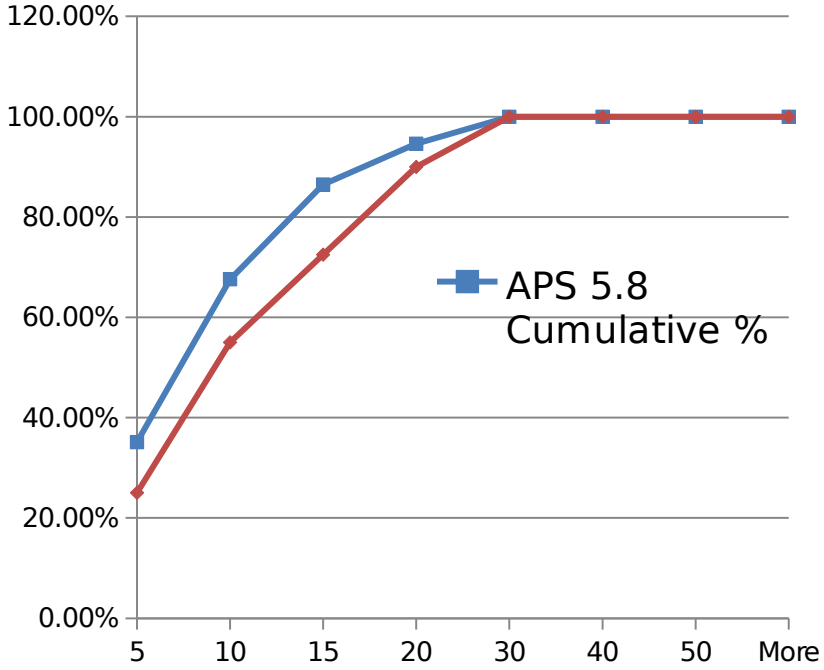
avg gain	0.9676	0.9530	0.9173	0.8786	0.8807	0.8580
stdev	0.0126	0.0109	0.0106	0.0101	0.0110	0.0238

APS evaluation 5.6 to 5.8 at MOBY VIIRS
Overall Improvement (M1-M5)

M1 Comparison



M2 Comparison

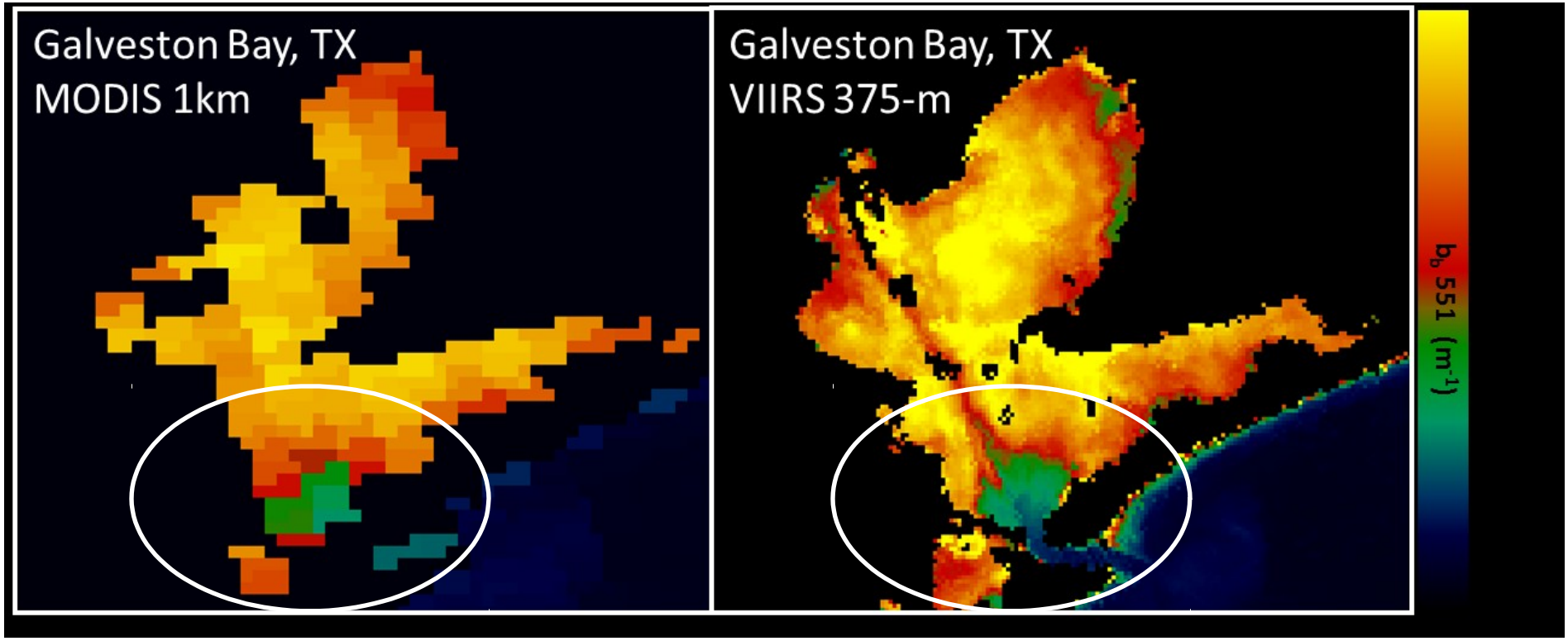


X-axis is % change from MOBY = |((VIIRS-insitu)/insitu)| *100

AOPS v4.12 High Resolution VIIRS (375m)

November 08, 2012

bb_551_qaa

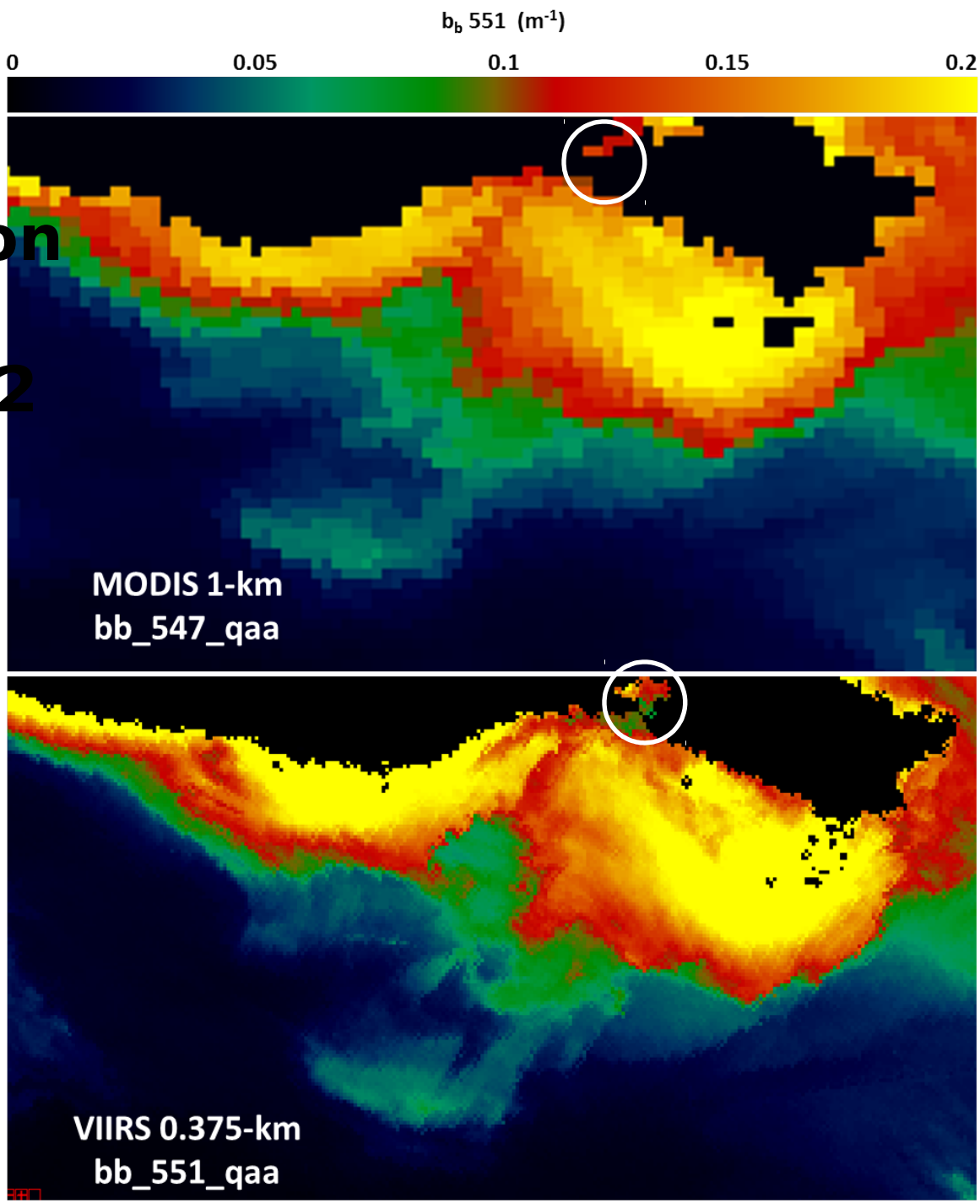


The spatially enhanced backscattering VIIRS products at 375 m resolution is compared to the 1 km MODIS for Coastal and Bay waters of the Texas Coast.

Implementation underway followed by evaluation.

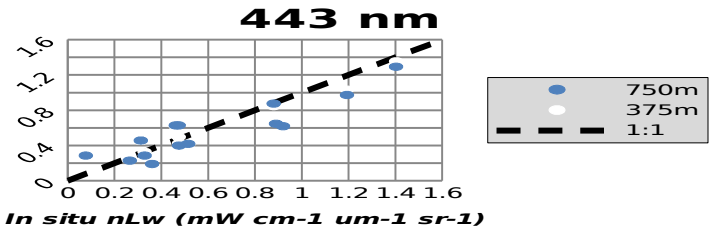
hanced Resolution
SNPP-VIIRS
ovember 08, 2012
Northern
Gulf of Mexico
Vermilion Bay, LA

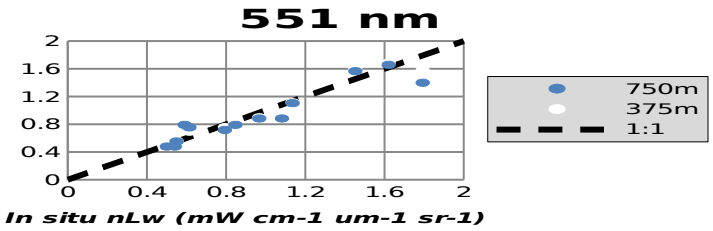
bb_551_qaa

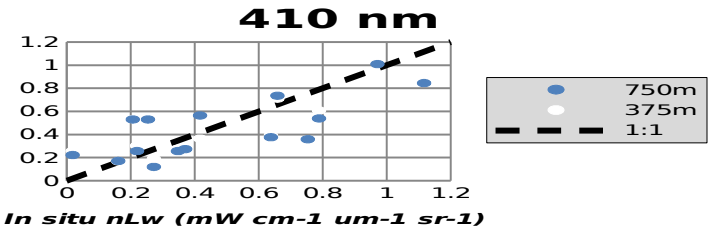


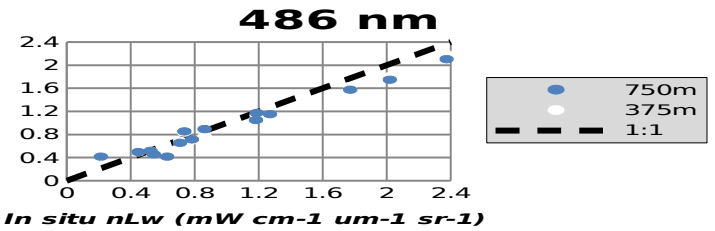
TOTAL MATCHUPS: 15
GEOCAPE Cruise Northern Gulf of Mexico

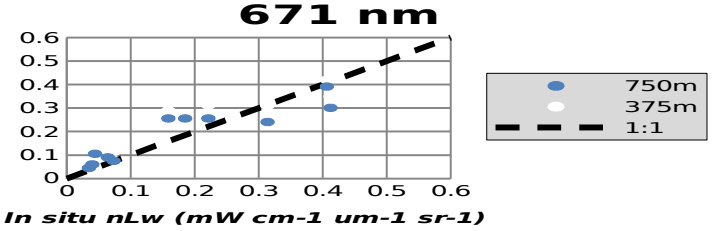
No significant spectral artifacts introduced through sharpening







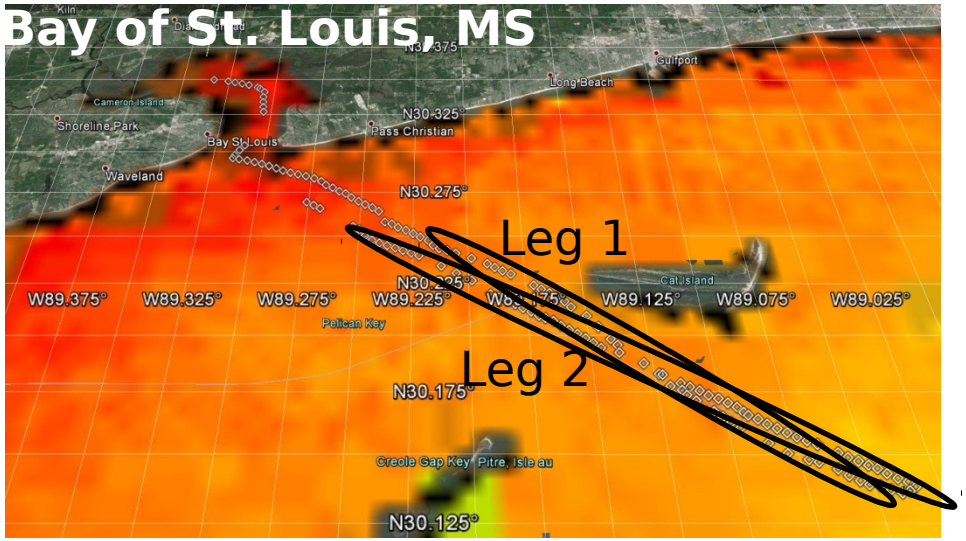


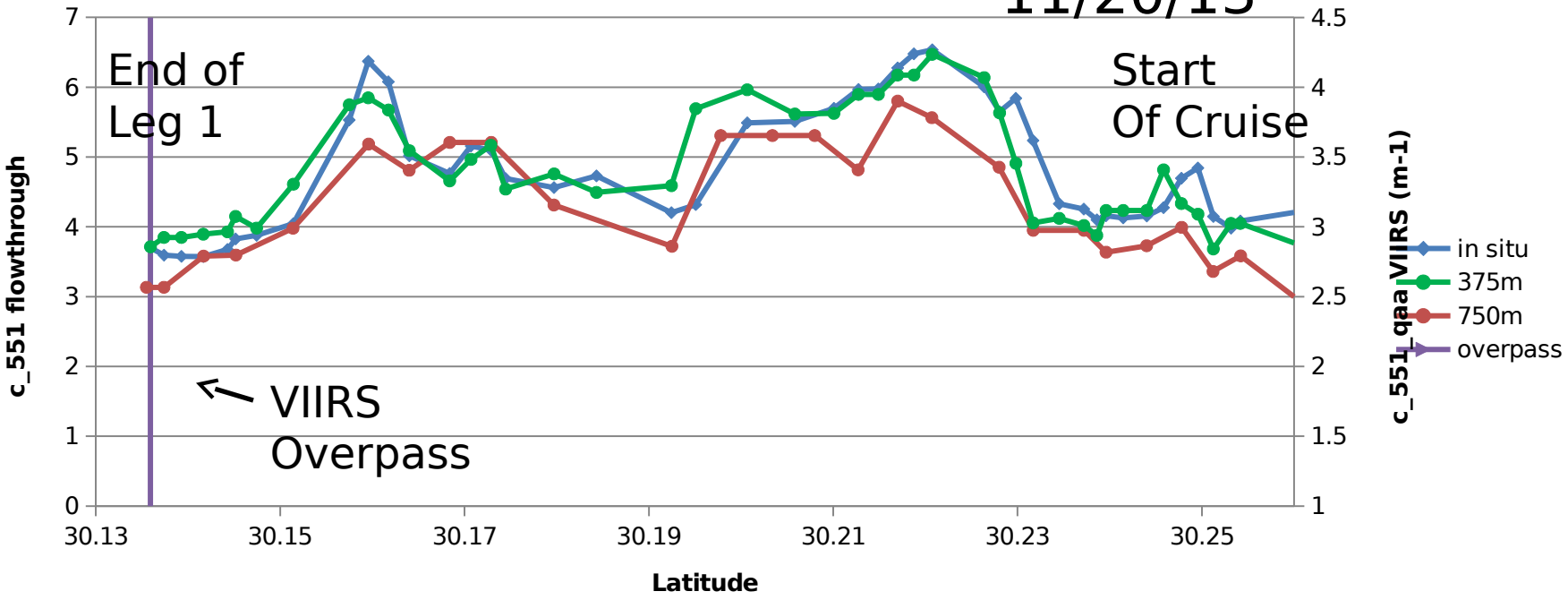


MATCHUP : TEST FEATURE DETECTION

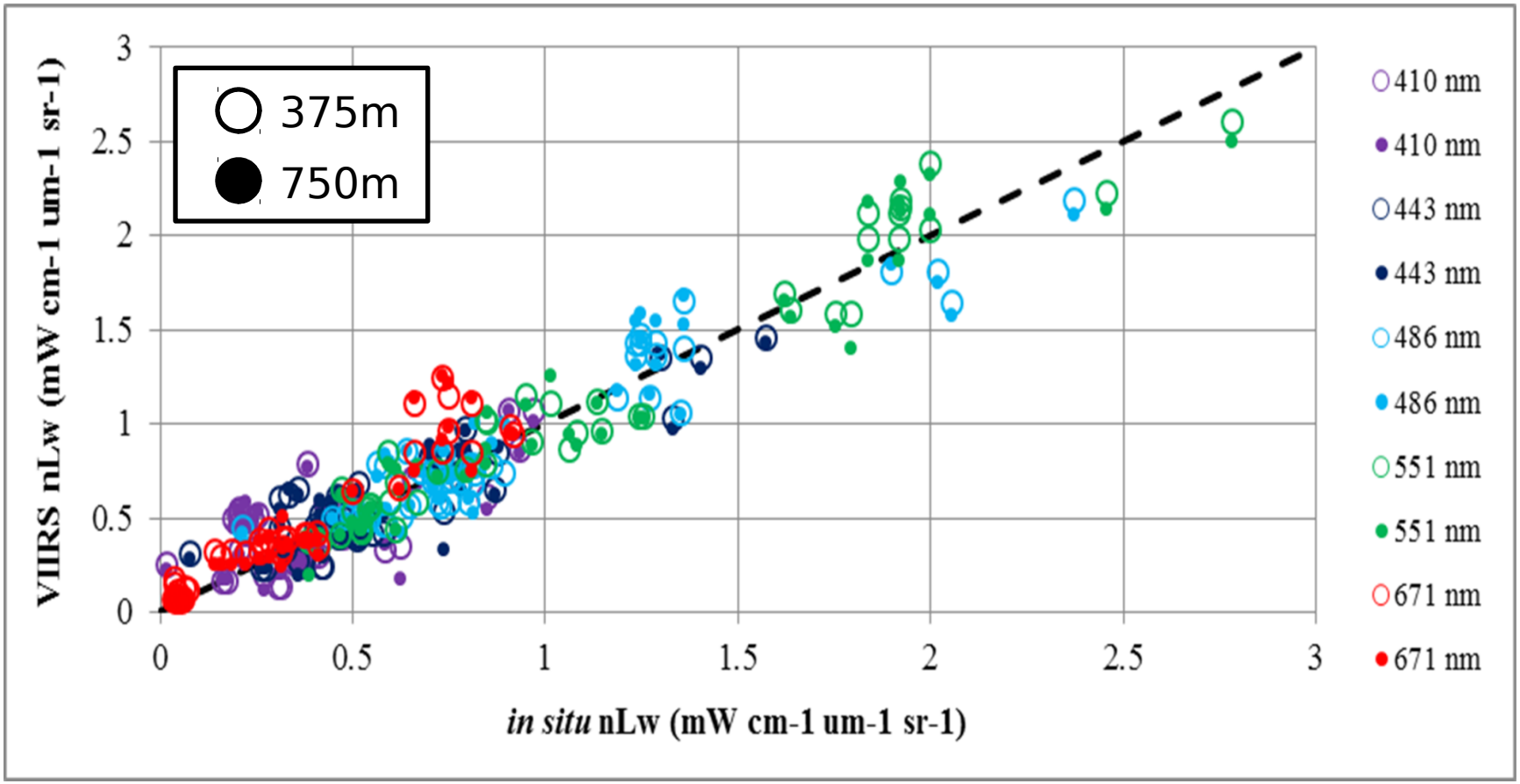
Naval Research Lab

R/V Ocean Color
Flow-through c_551nm
11/20/13

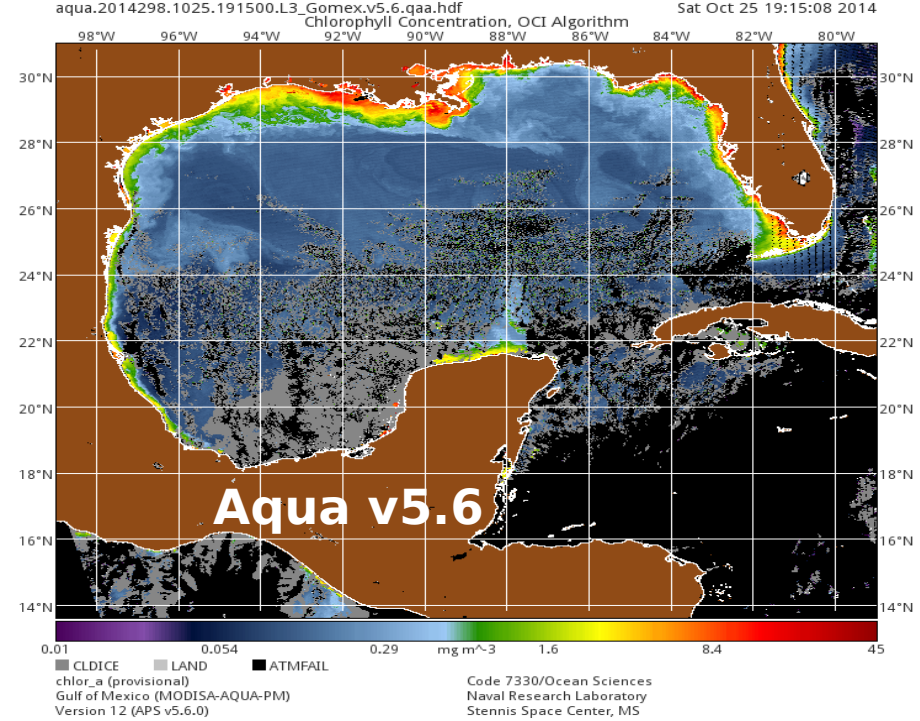




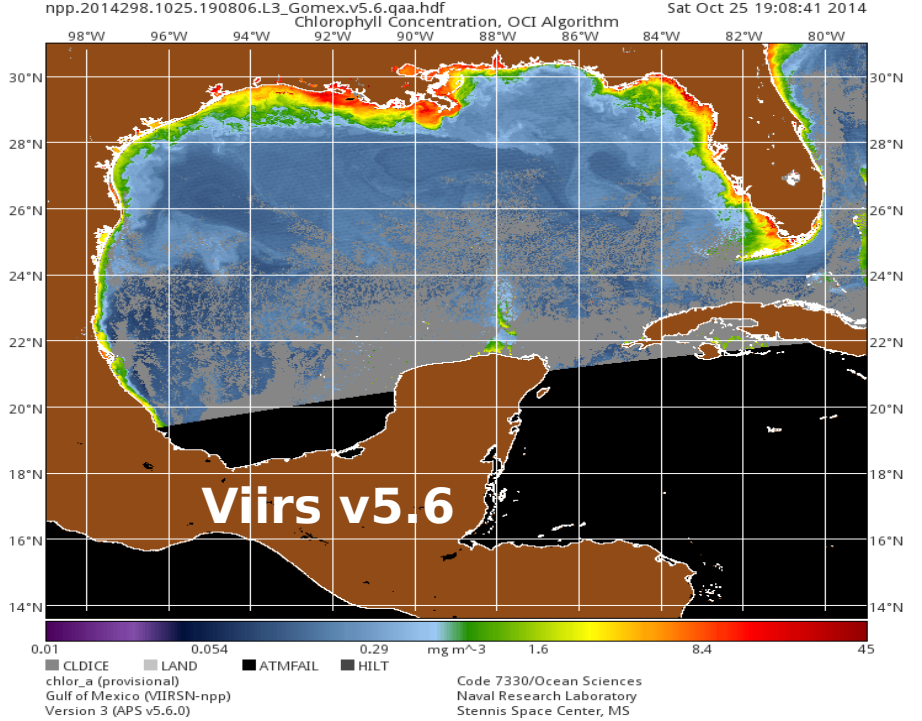
44 Matchups (Gomex, Chesapeake Bay)

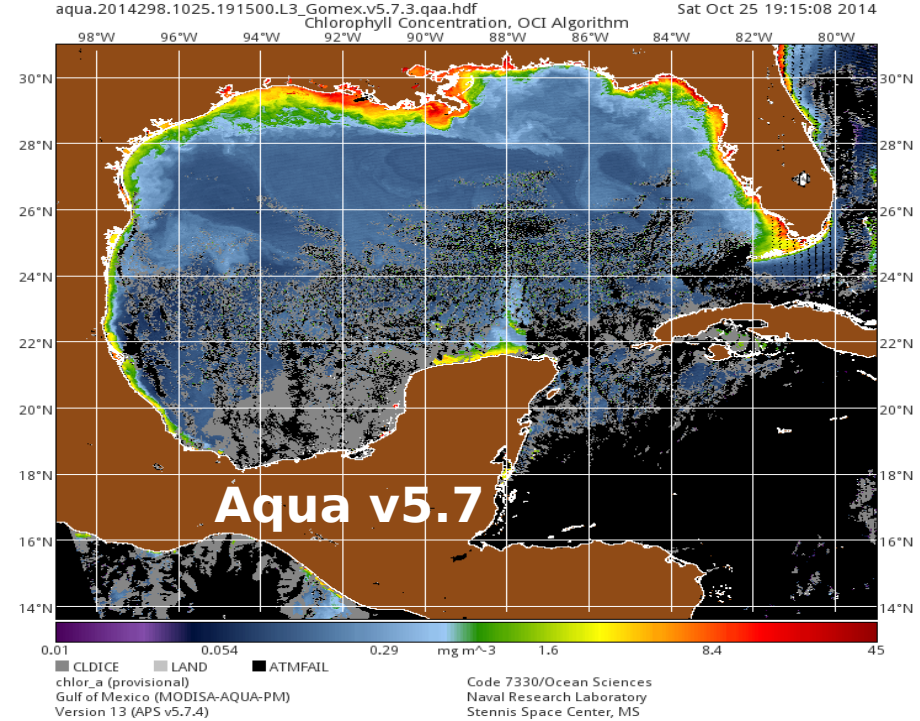


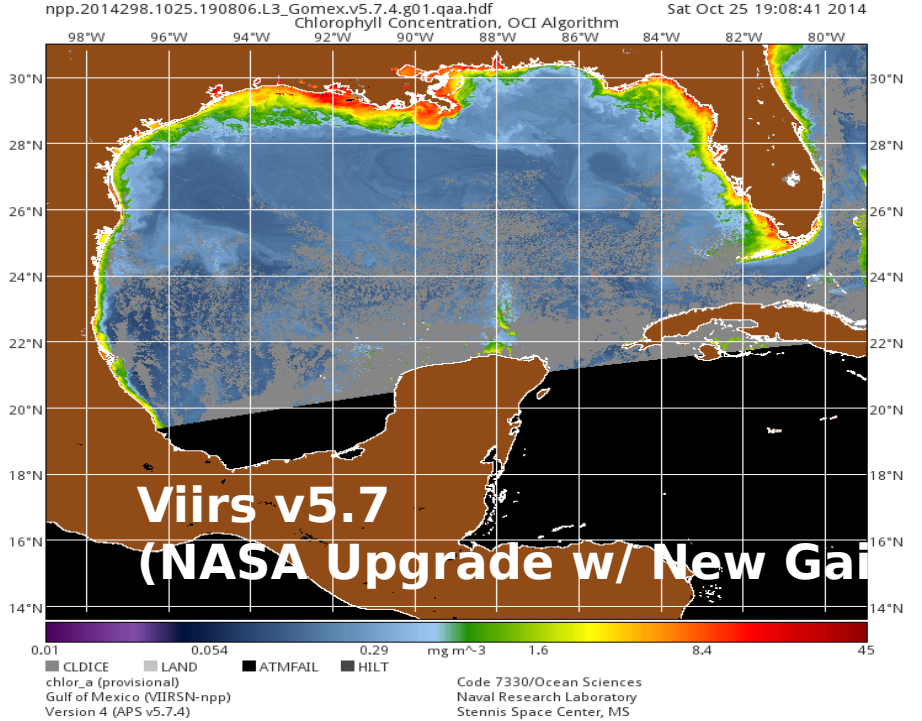
	VIIRS 375-m		VIIRS 750-m	
λ	**Slope**	**r2**	**Slope**	**r2**
410	0.9943	0.8666	0.9892	0.8510
443	0.9746	0.9563	0.9688	0.9476
486	0.9648	0.9787	0.9823	0.9715
551	1.0092	0.9866	0.9941	0.9808
671	1.2532	0.9636	1.2330	0.9528

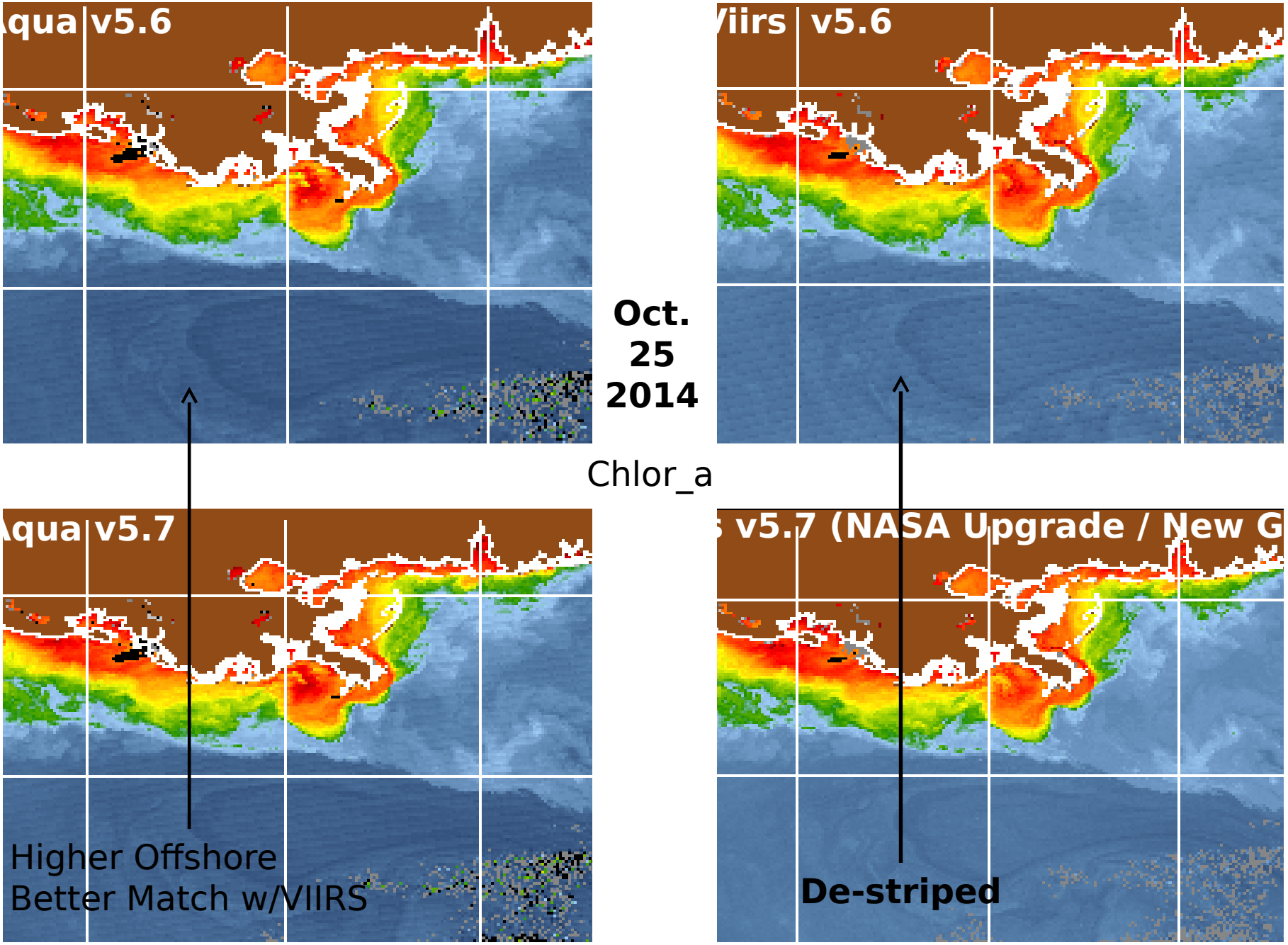

aqua.2014298.1025.191500.L3_Gomex.v5.6.qaa.hdf
Sat Oct 25 19:15:08 2014
Chlorophyll Concentration, OCI Algorithm
98°W 96°W 94°W 92°W 90°W 88°W 86°W 84°W 82°W 80°W
30°N 28°N 26°N 24°N 22°N 20°N 18°N 16°N 14°N
Aqua v5.6
0.01 0.054 0.29 mg m^-3 1.6 8.4 45
CLDICE LAND ATMFAIL
chlor_a (provisional)
Gulf of Mexico (MODISA-AQUA-PM)
Version 12 (APS v5.6.0)
Code 7330/Ocean Sciences
Naval Research Laboratory
Stennis Space Center, MS

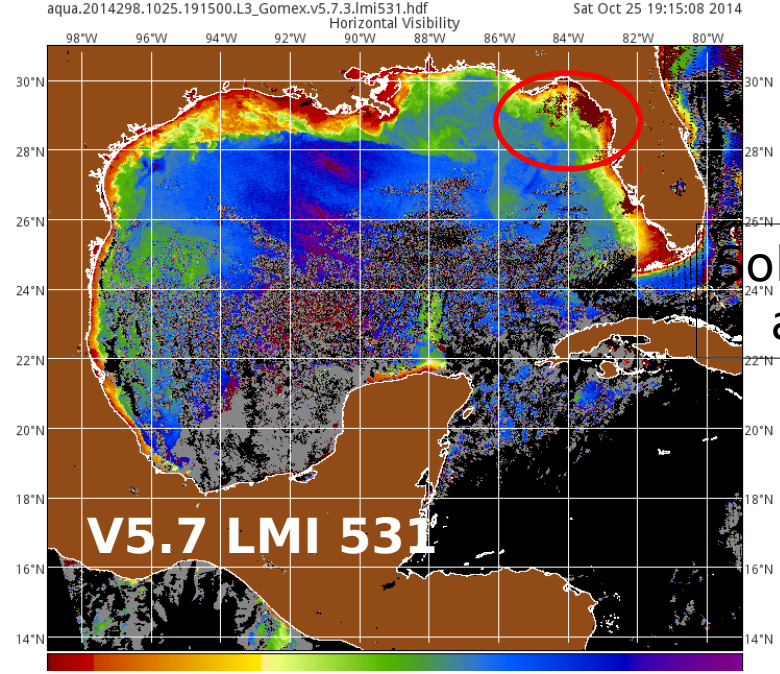
CHLOR


npp.2014298.1025.190806.L3_Gomex.v5.6.qaa.hdf
Sat Oct 25 19:08:41 2014
Chlorophyll Concentration, OCI Algorithm
98°W 96°W 94°W 92°W 90°W 88°W 86°W 84°W 82°W 80°W
30°N 28°N 26°N 24°N 22°N 20°N 18°N 16°N 14°N
Viirs v5.6
0.01 0.054 0.29 mg m^-3 1.6 8.4 45
CLDICE LAND ATMFAIL HILT
chlor_a (provisional)
Gulf of Mexico (VIIRSN-npp)
Version 3 (APS v5.6.0)
Code 7330/Ocean Sciences
Naval Research Laboratory
Stennis Space Center, MS

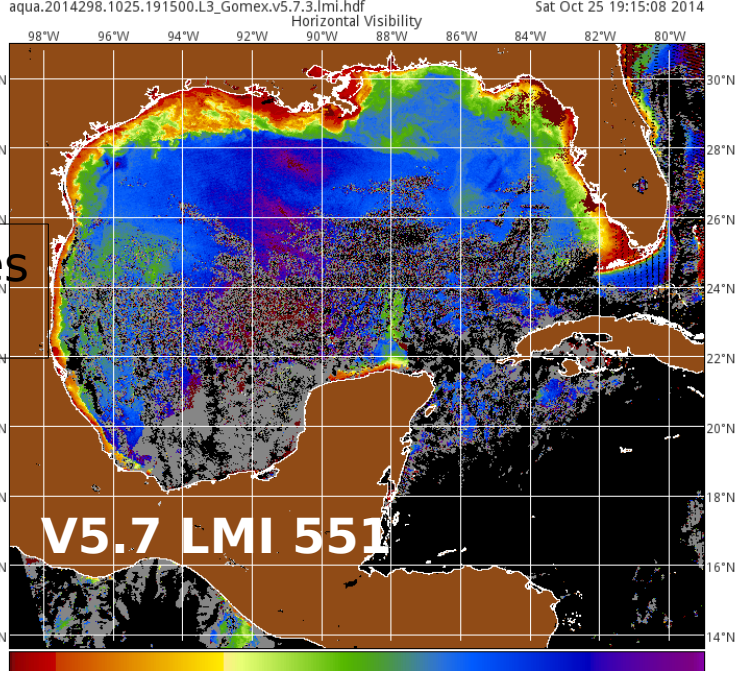

aqua.2014298.1025.191500.L3_Gomex.v5.7.3.qaa.hdf
Sat Oct 25 19:15:08 2014
Chlorophyll Concentration, OCI Algorithm
98°W 96°W 94°W 92°W 90°W 88°W 86°W 84°W 82°W 80°W
30°N 28°N 26°N 24°N 22°N 20°N 18°N 16°N 14°N
Aqua v5.7
0.01 0.054 0.29 mg m^-3 1.6 8.4 45
CLDICE LAND ATMFAIL
chlor_a (provisional)
Gulf of Mexico (MODISA-AQUA-PM)
Version 13 (APS v5.7.4)
Code 7330/Ocean Sciences
Naval Research Laboratory
Stennis Space Center, MS


npp.2014298.1025.190806.L3_Gomex.v5.7.4.g01.qaa.hdf
Sat Oct 25 19:08:41 2014
Chlorophyll Concentration, OCI Algorithm
98°W 96°W 94°W 92°W 90°W 88°W 86°W 84°W 82°W 80°W
30°N 28°N 26°N 24°N 22°N 20°N 18°N 16°N 14°N
Viirs v5.7
(NASA Upgrade w/ New Gai
0.01 0.054 0.29 mg m^-3 1.6 8.4 45
CLDICE LAND ATMFAIL HILT
chlor_a (provisional)
Gulf of Mexico (VIIRSN-npp)
Version 4 (APS v5.7.4)
Code 7330/Ocean Sciences
Naval Research Laboratory
Stennis Space Center, MS

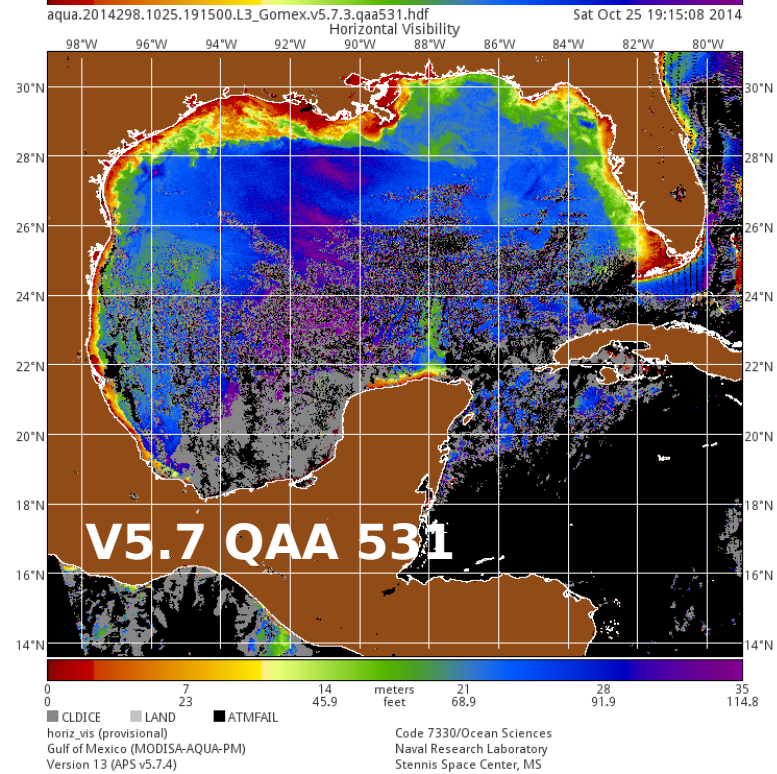

qua v5.6
iirs v5.6
Oct.
25
2014
Chlor_a
qua v5.7
v5.7 (NASA Upgrade / New G
Higher Offshore
Better Match w/VIIRS
De-striped

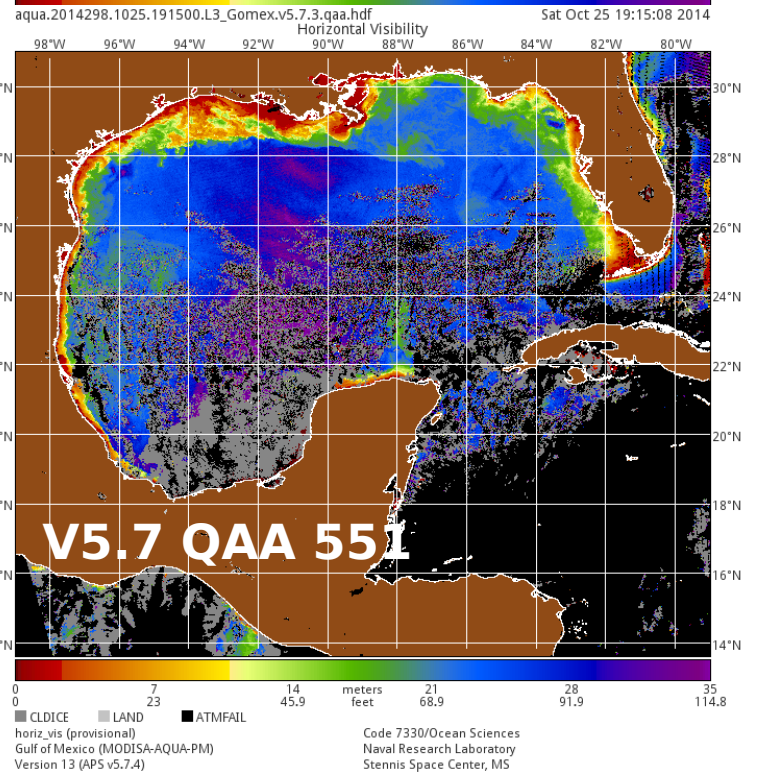


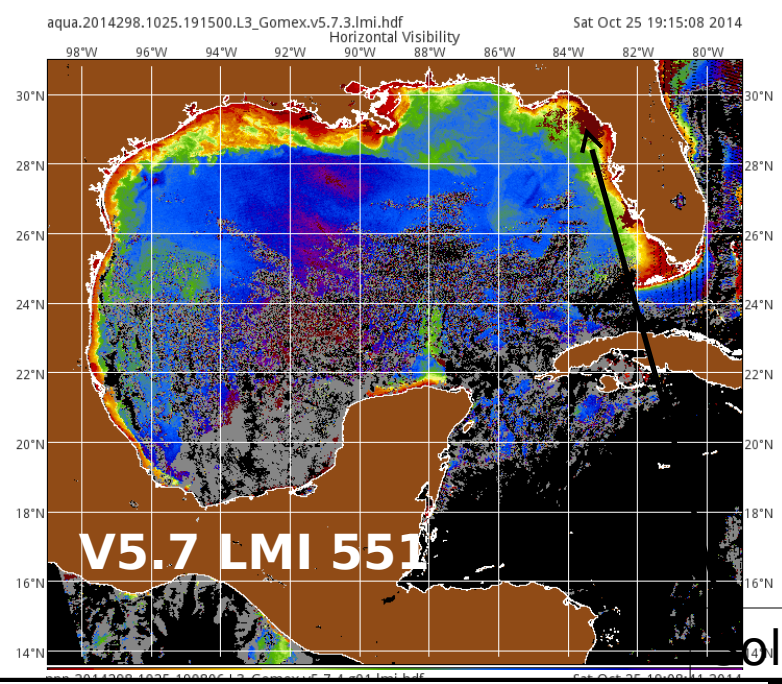
Solid Maroon Values are LMI Failures



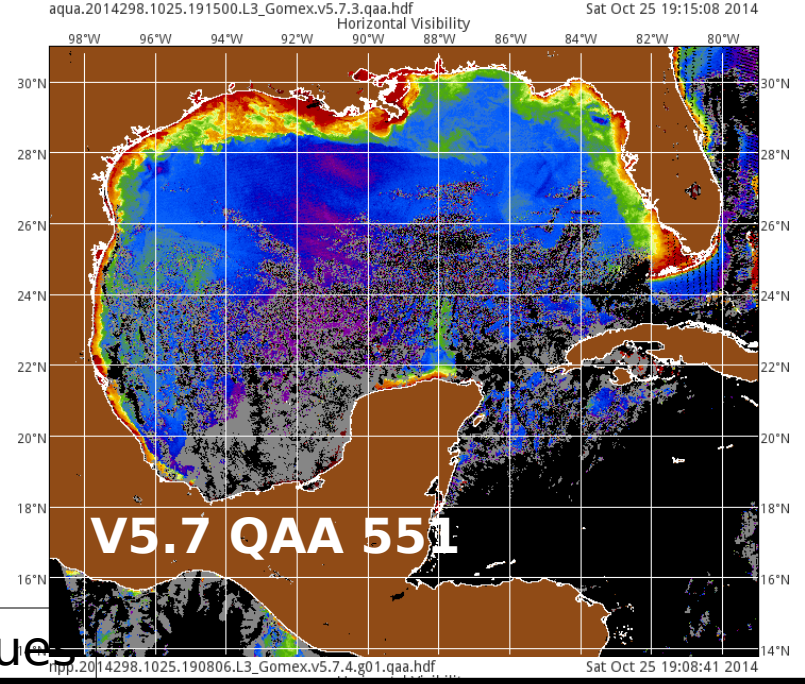
10/25/14
MODIS
Horizontal
Visibility



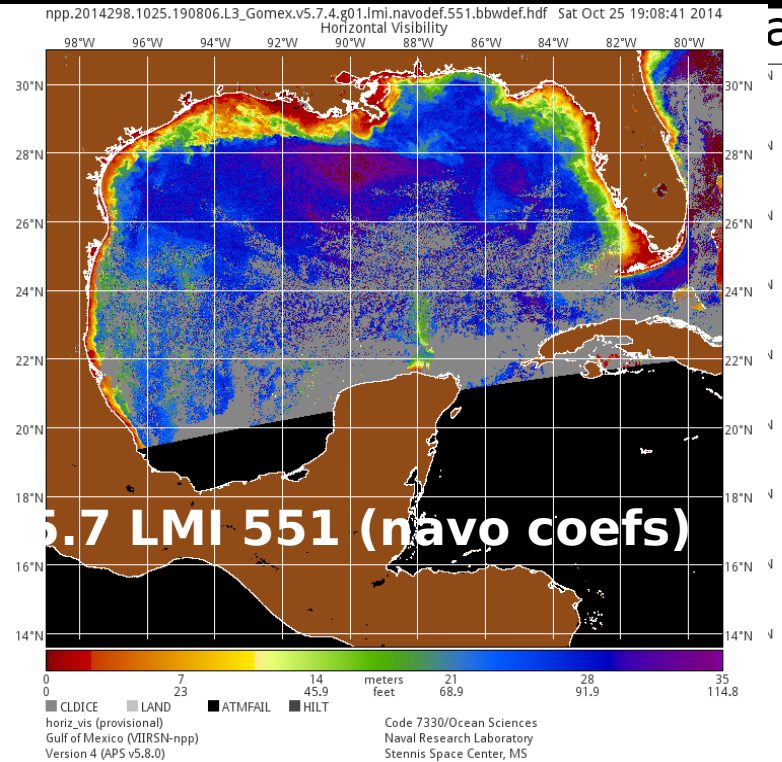




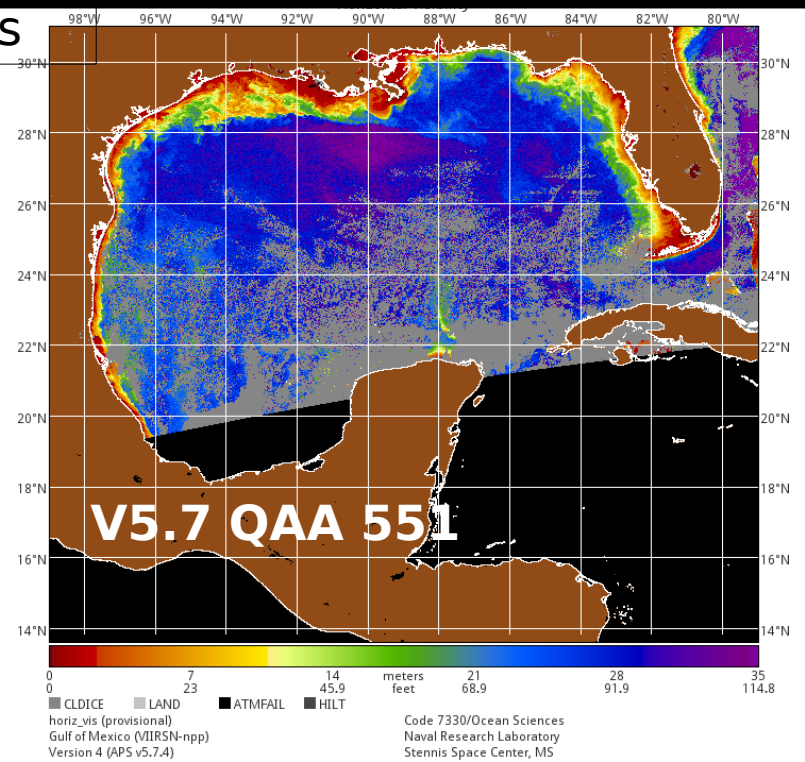
10/25/14
MODIS
Horizontal
Visibility



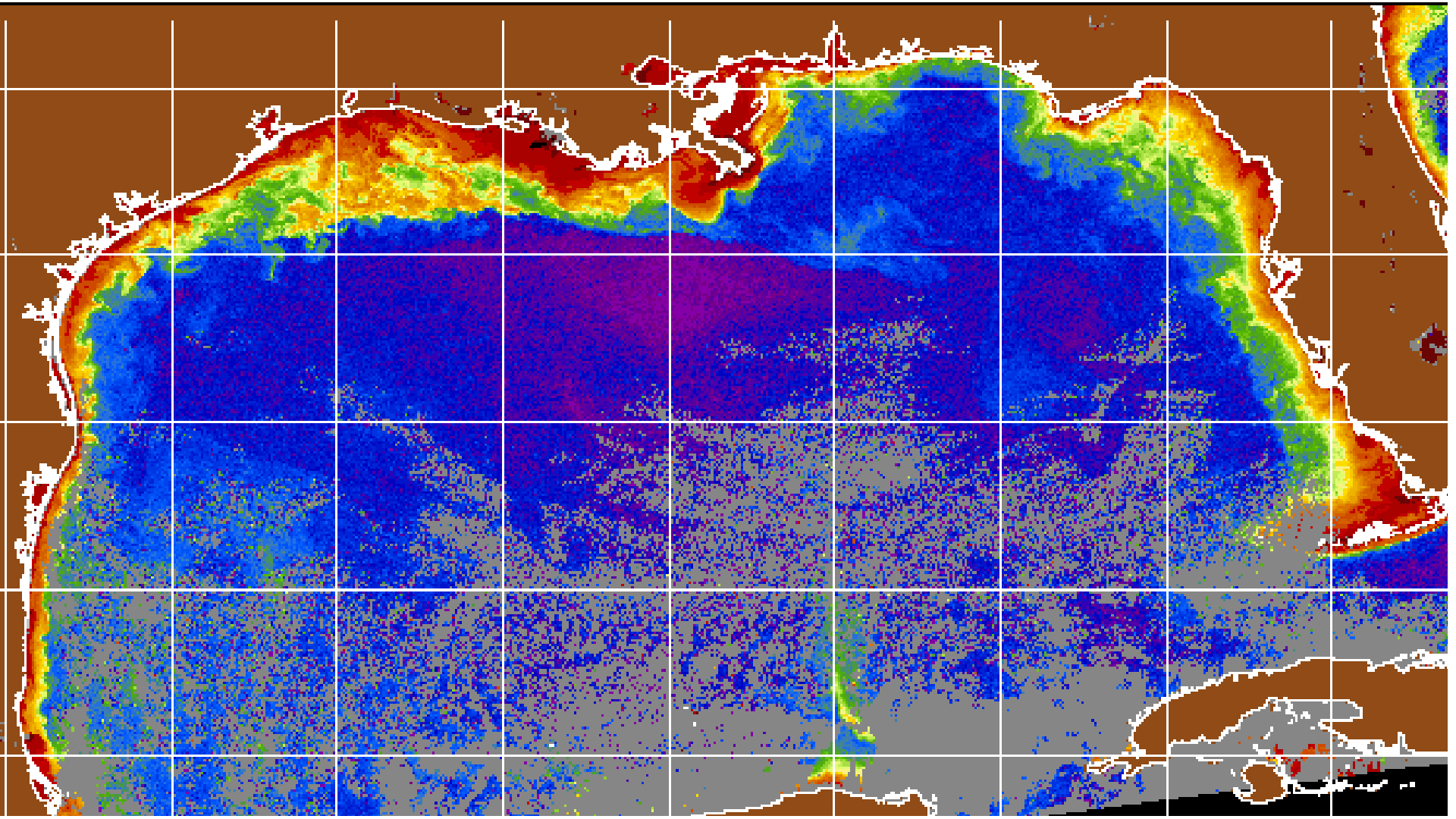
olid Maroon Values
are LMI Failures



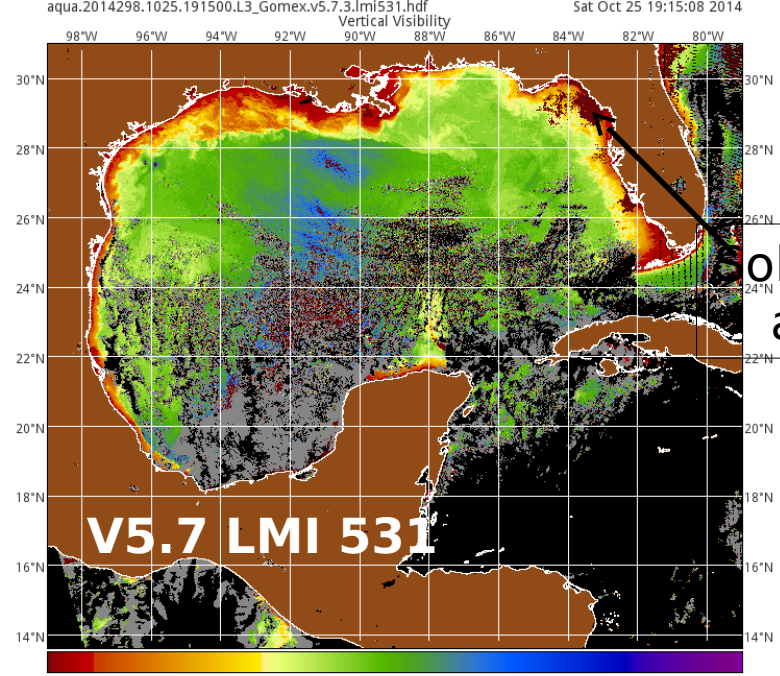
10/25/14
VIIRS
Horizontal
Visibility

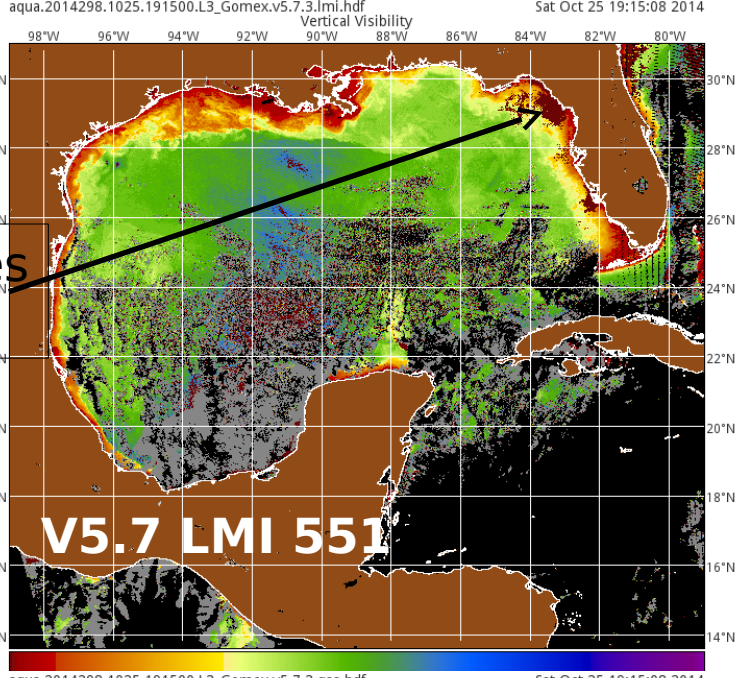


VIIRS - VIIRS – 10/25/14 - Horiz_Vis (551) QAA Coefs



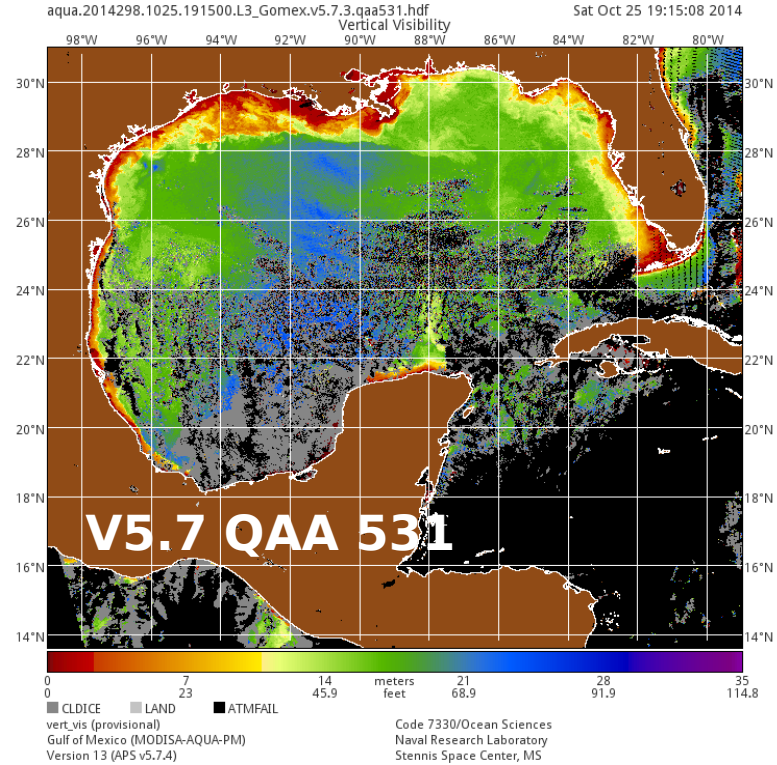
Not much difference! Use slide show and focus on top-left LMI image.
QAA image will appear when click left mouse button

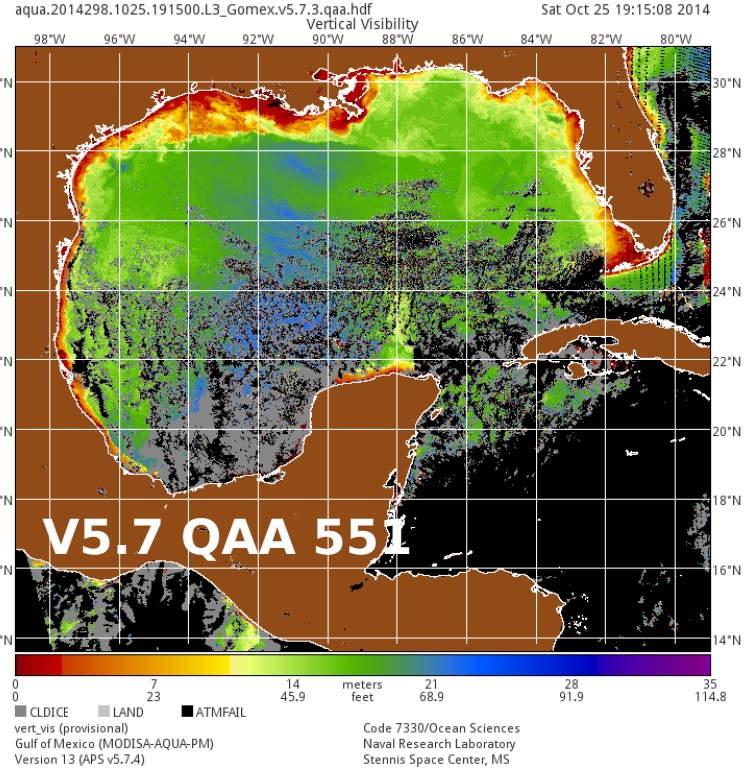


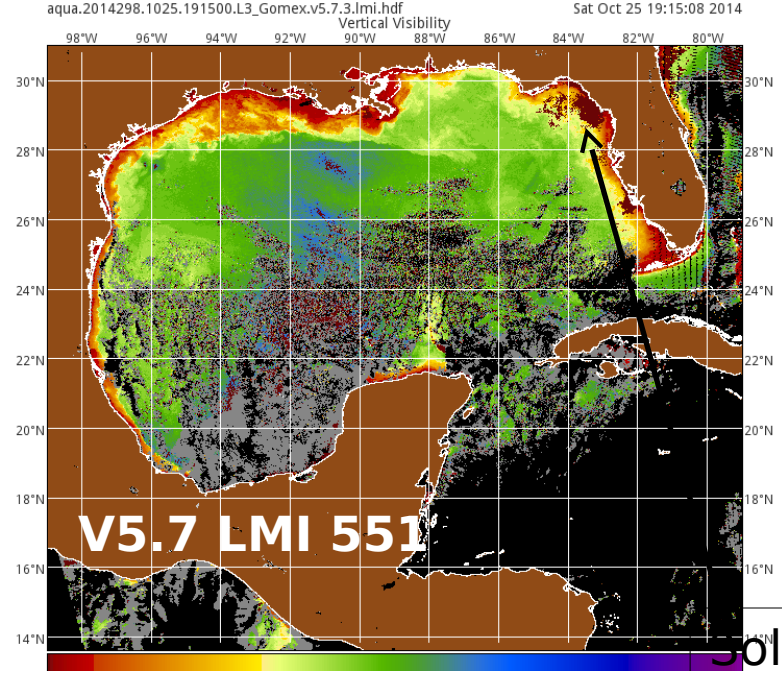


Solid Maroon Values are LMI Failures

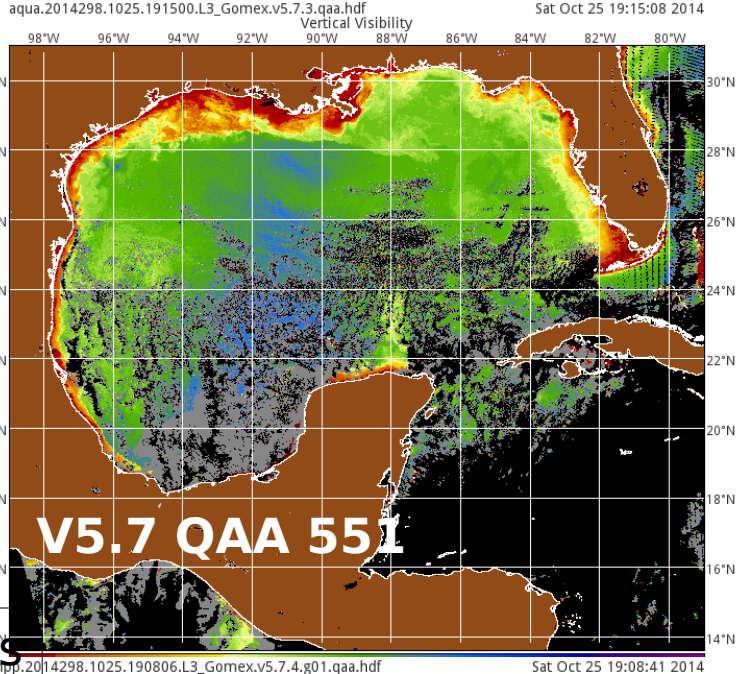
10/25/14
MODIS
Vertical
Visibility



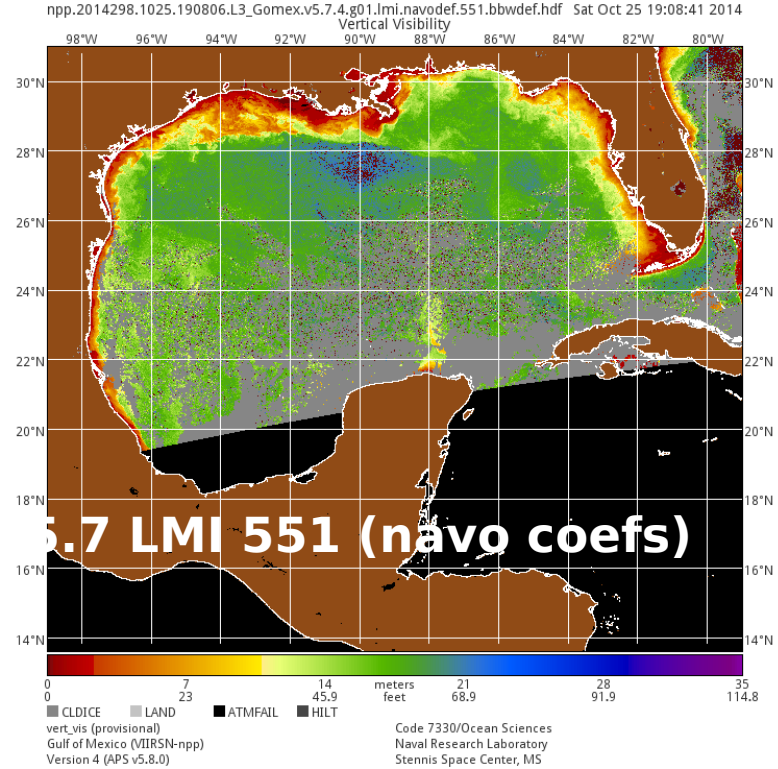




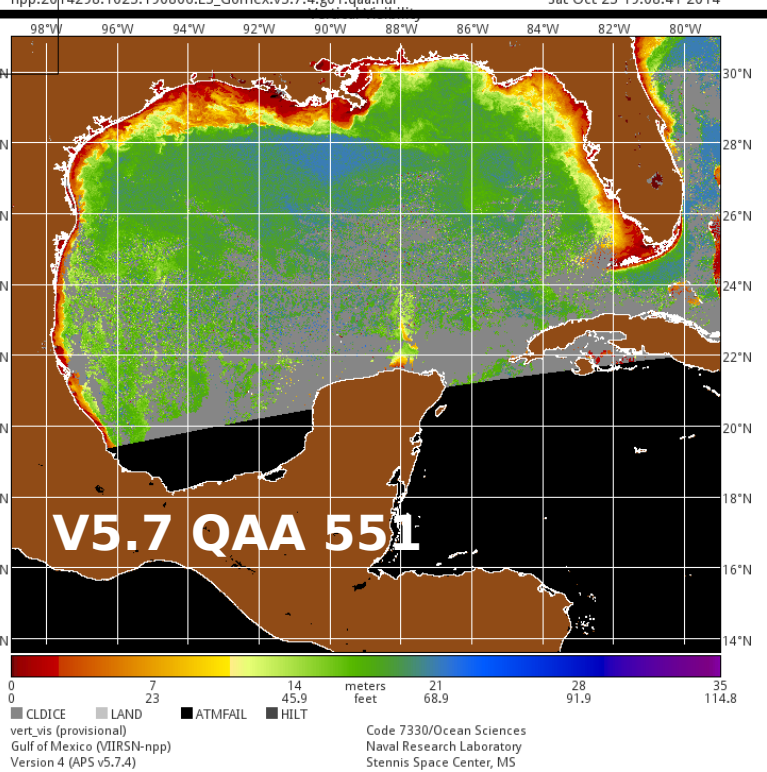
10/25/14
MODIS
Vertical
Visibility



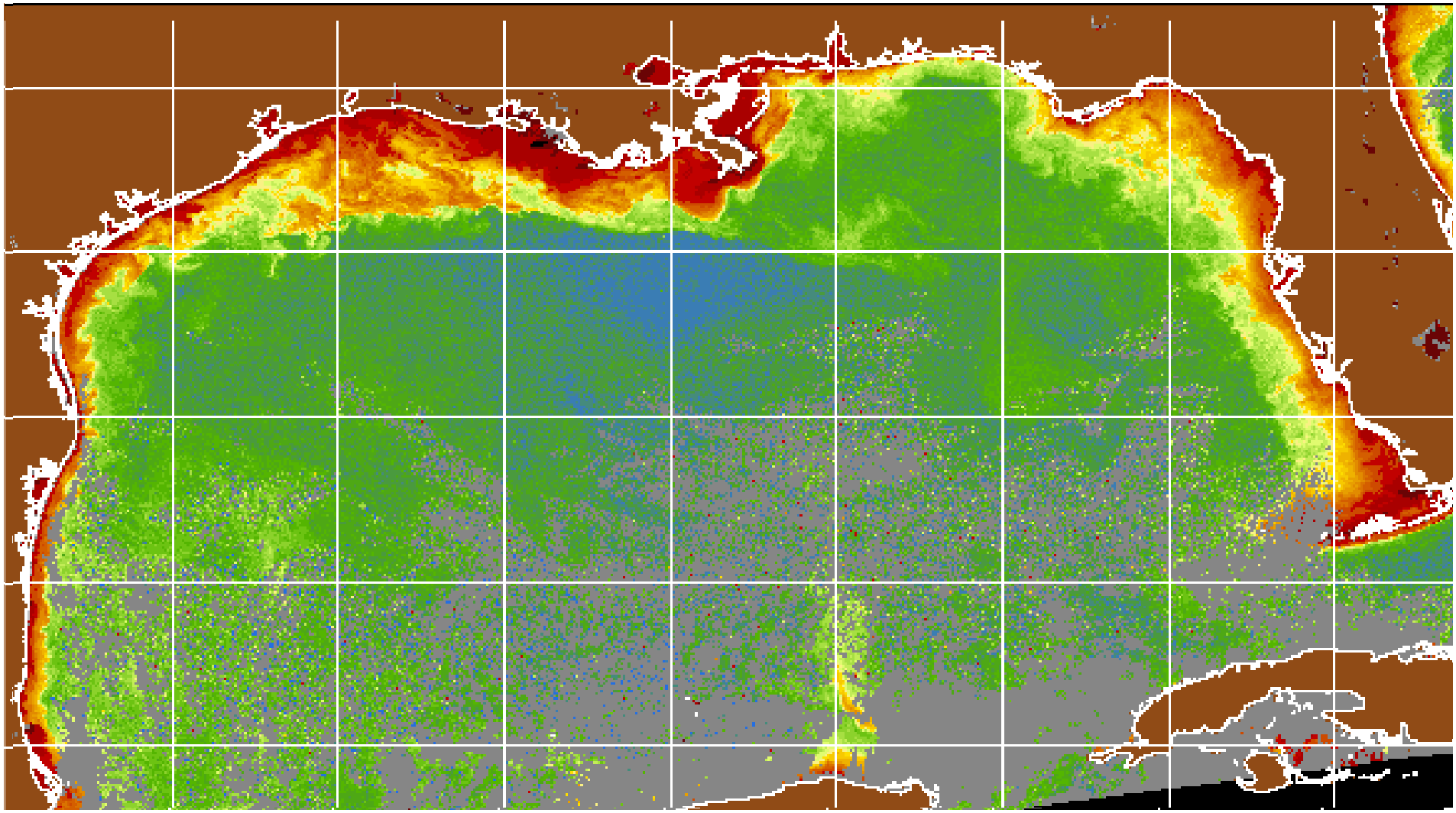
Solid Maroon Values
re LMI Failures



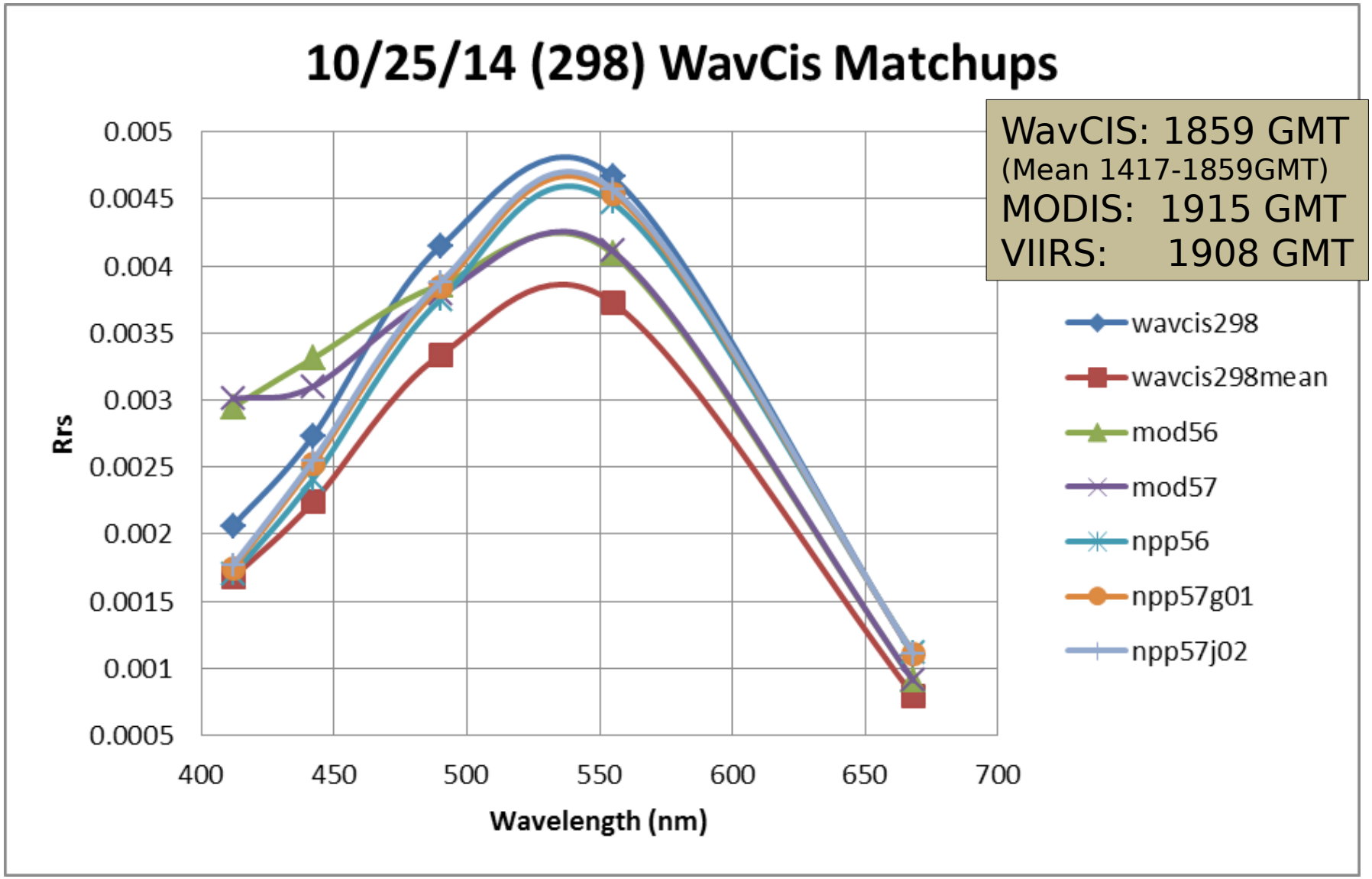
10/25/14
VIIRS
Vertical
Visibility

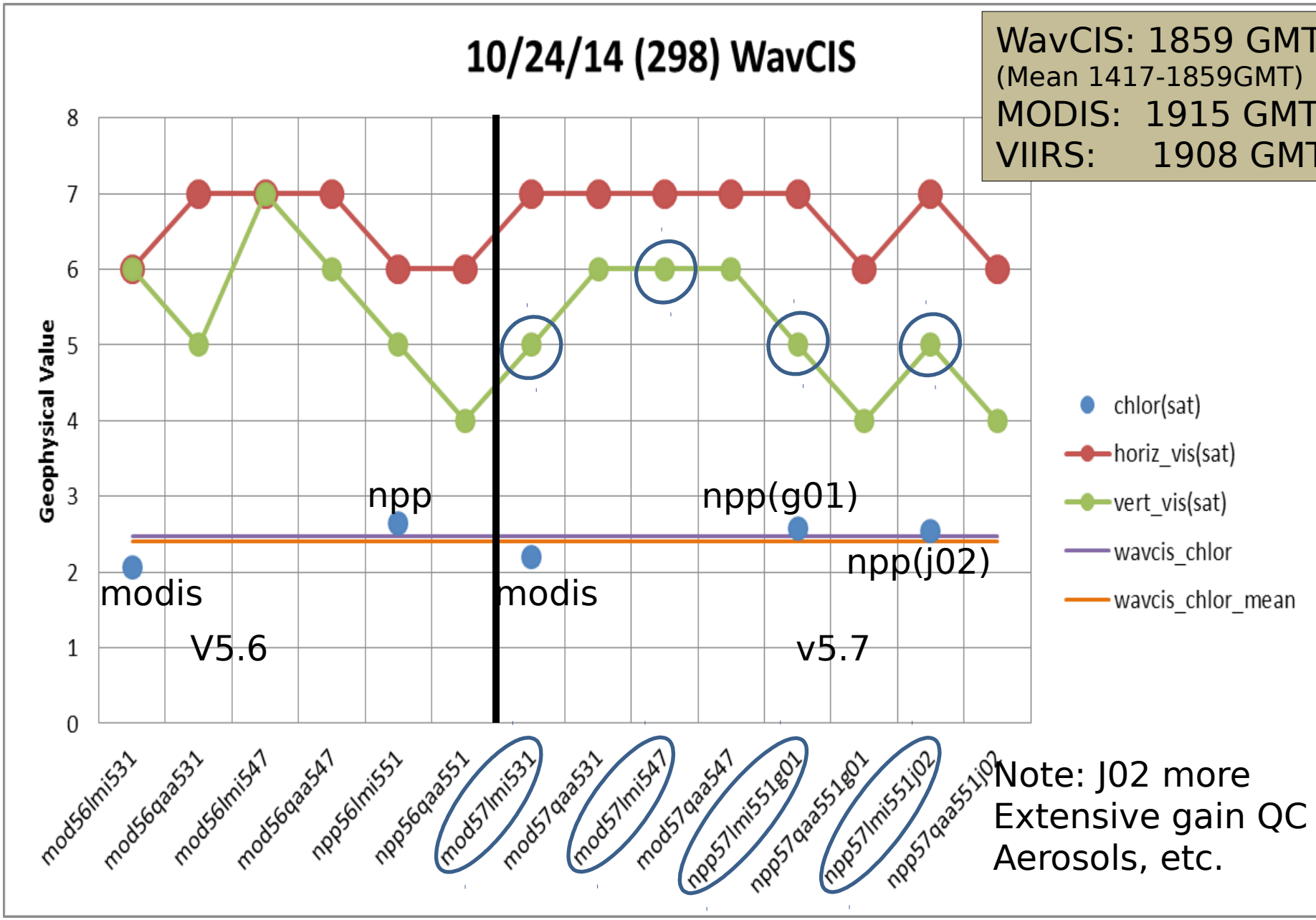


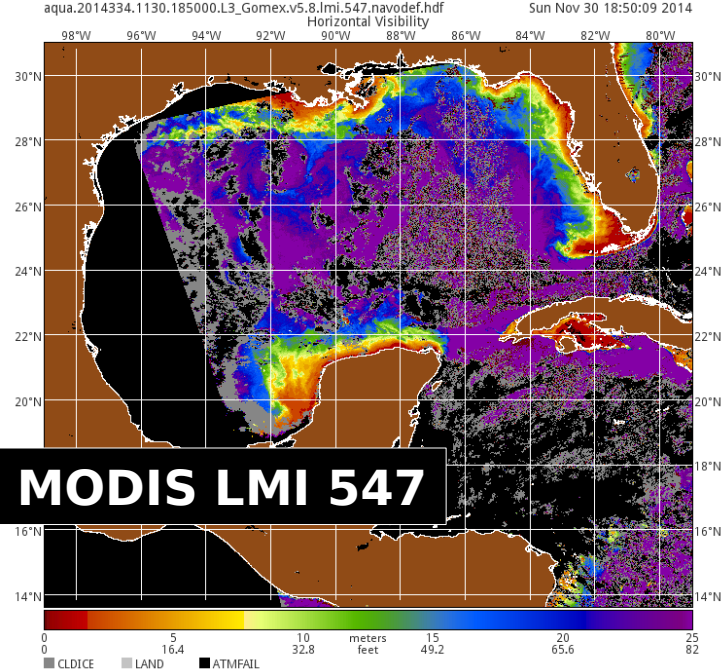
VIIRS	VIIRS – 10/25/14 - Vert_Vis (551) QAA	Coefs

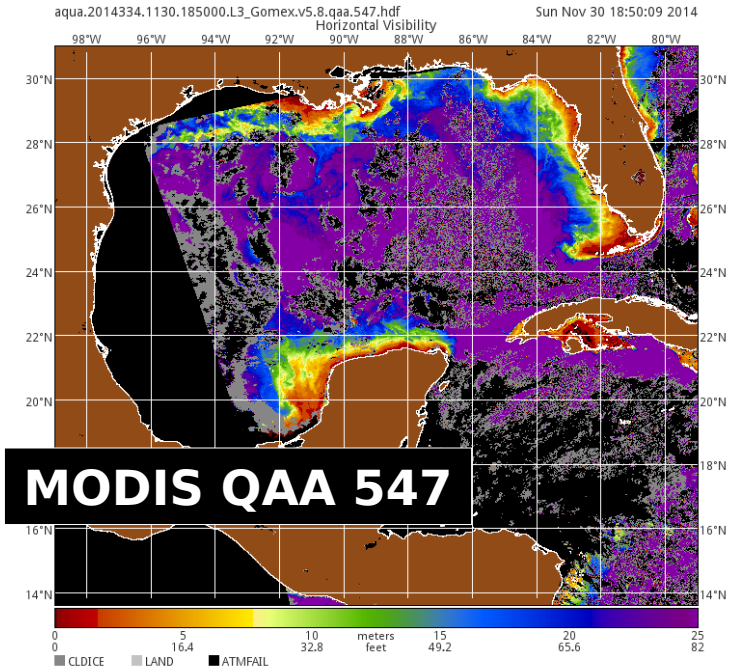


Not much difference! Use slide show and focus on top-left LMI image.
QAA image will appear when click left mouse button

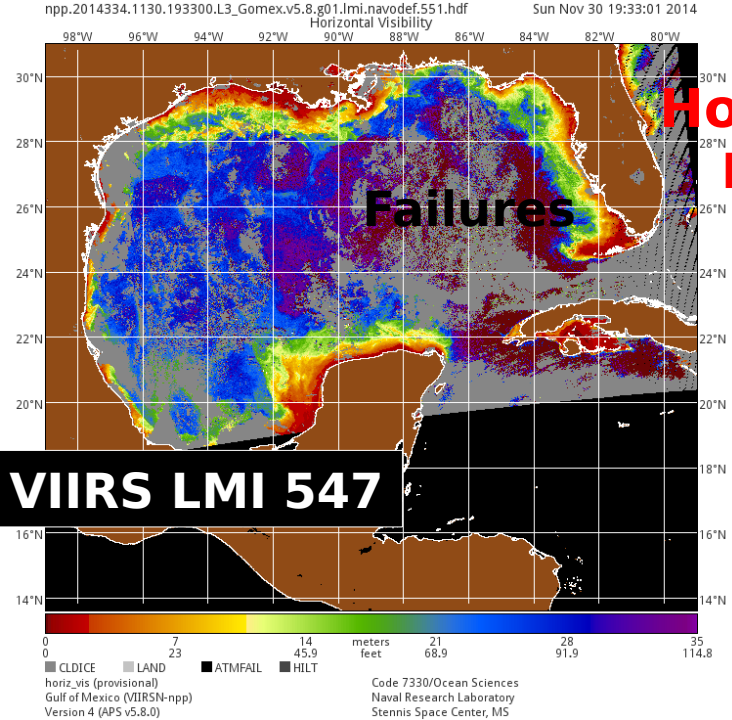

10/25/14 (298) WavCis Matchups
WavCIS: 1859 GMT
(Mean 1417-1859GMT)
MODIS: 1915 GMT
VIIRS: 1908 GMT
wavcis298
wavcis298mean
mod56
mod57
npp56
npp57g01
npp57j02
Rrs
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
400
450
500
550
600
650
700
Wavelength (nm)

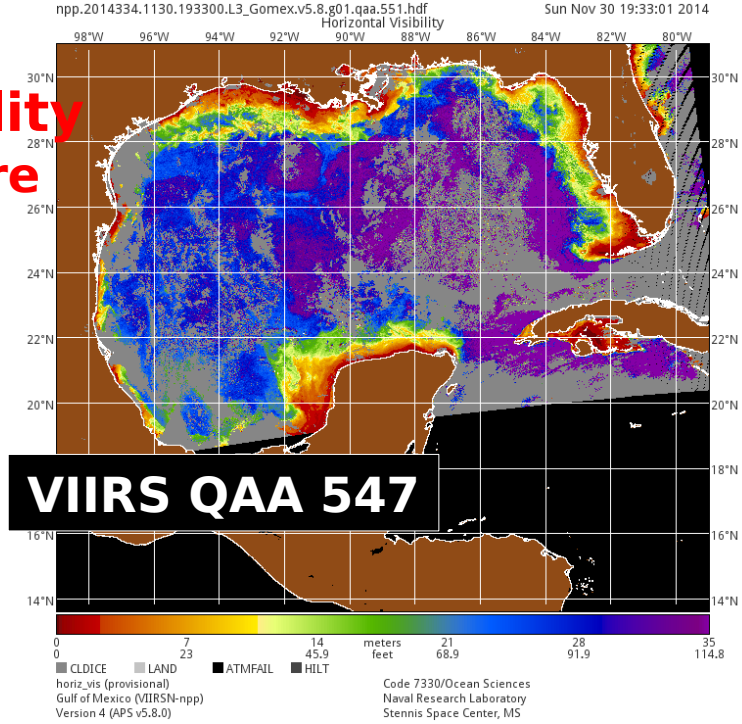

10/24/14 (298) WavCIS
WavCIS: 1859 GMT
(Mean 1417-1859GMT)
MODIS: 1915 GMT
VIIRS: 1908 GMT
Geophysical Value
0
1
2
3
4
5
6
7
8
chlor(sat)
horiz_vis(sat)
vert_vis(sat)
wavcis_chlor
wavcis_chlor_mean
modis
npp
modis
npp(g01)
npp(j02)
V5.6
v5.7
mod56lmi531
mod56qaa531
mod56lmi547
mod56qaa547
npp56lmi551
npp56qaa551
mod57lmi531
mod57qaa531
mod57lmi547
mod57qaa547
npp57lmi551g01
npp57qaa551g01
npp57lmi551j02
npp57qaa551j02
Note: J02 more
Extensive gain QC
Aerosols, etc.





AOPS v4.12
Gulf of Mexico
Nov. 30, 2014
Horizontal Visibility
LMI/QAA Compare

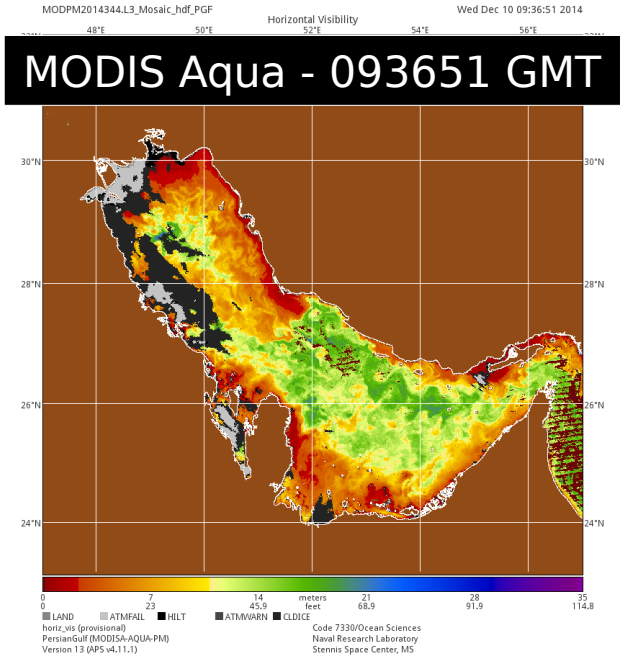




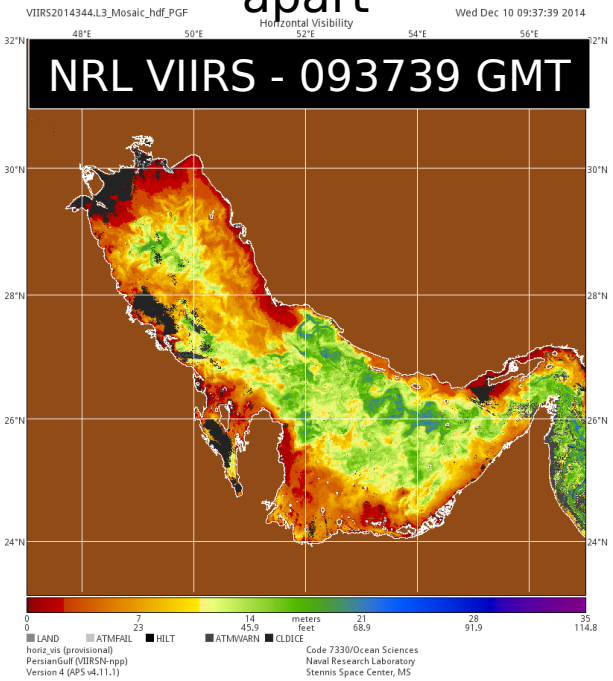
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

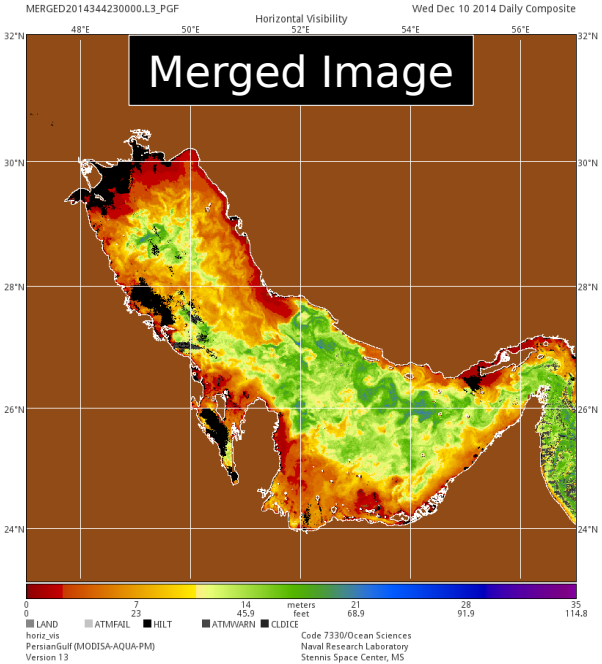
Example: Persian Gulf – December 10, 2014

Horizontal Visibility : Good Agreement



@1 minute apart



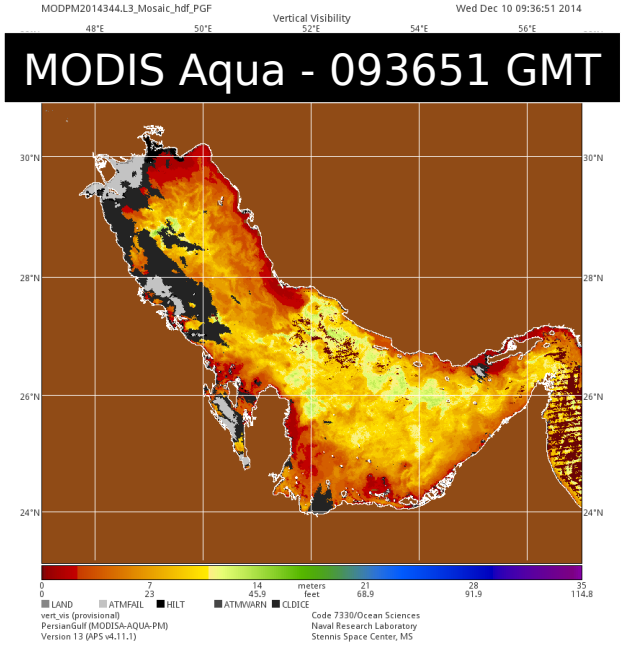


Implementation Complete
Delivered Q1FY15

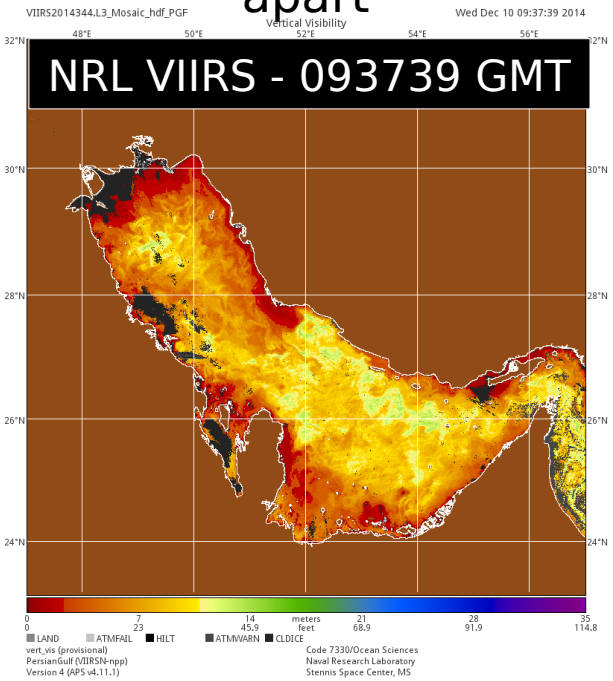
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

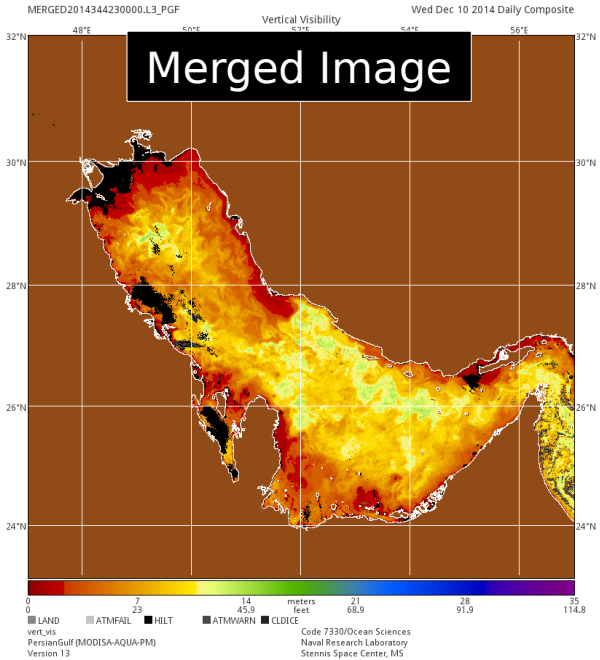
Example: Persian Gulf – December 10, 2014

Vertical Visibility : Good Agreement



@1 minute apart



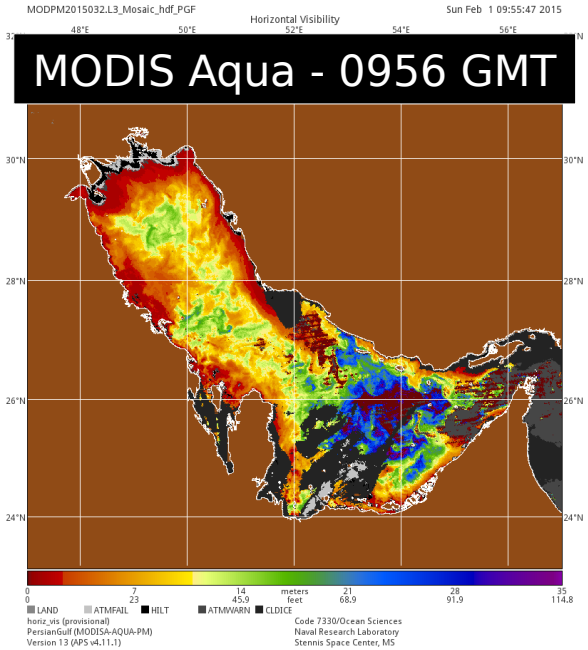


Implementation Complete
Delivered Q1FY15

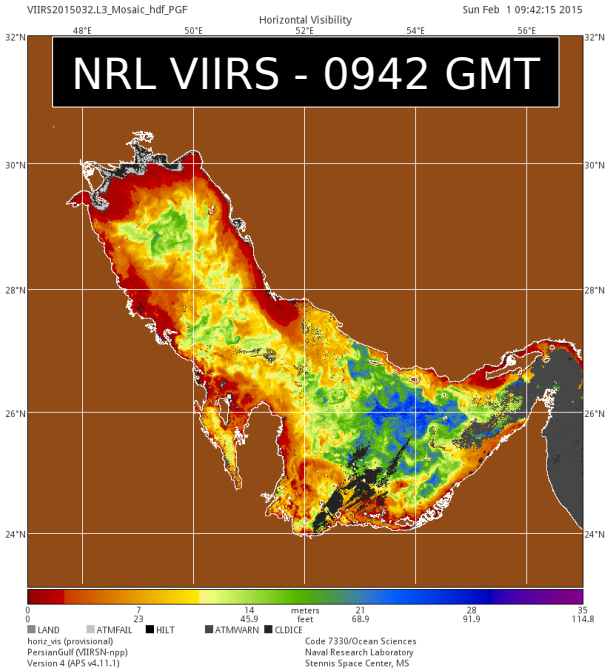
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

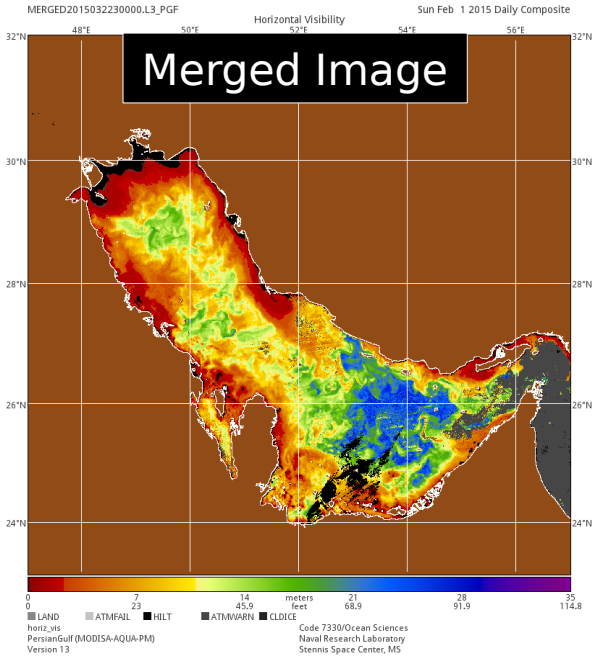
Example: Persian Gulf – February 01, 2015

Horizontal Visibility : Good Agreement



@14minutes apart



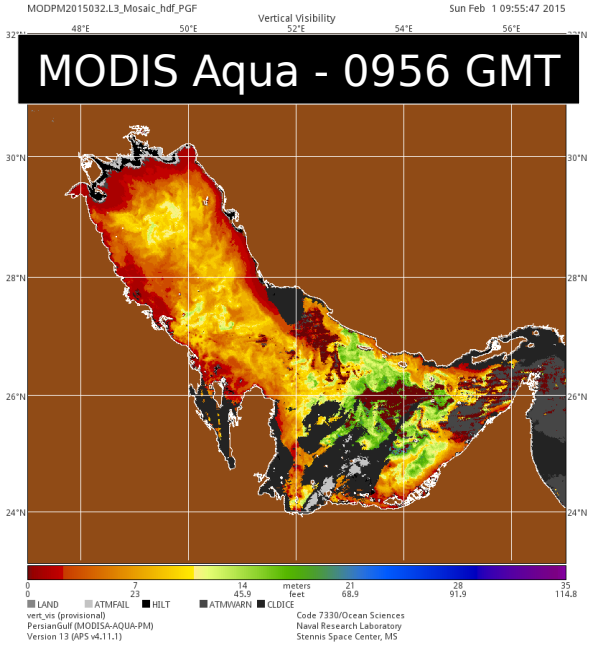


Implementation Complete
Delivered Q1FY15

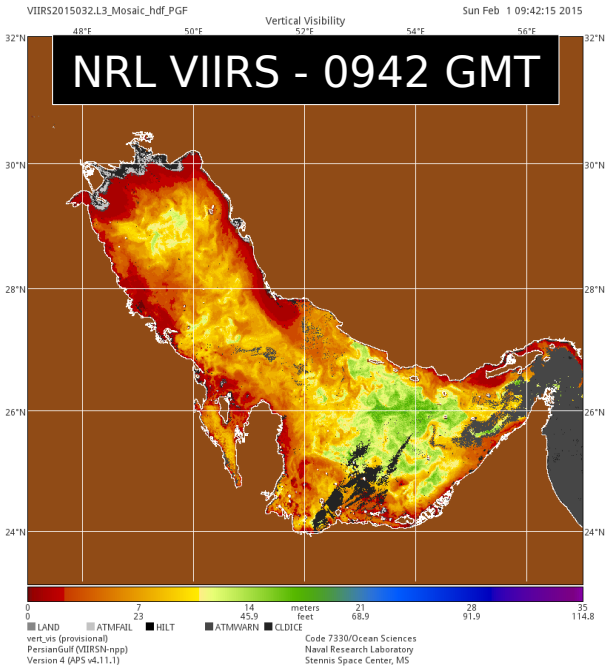
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

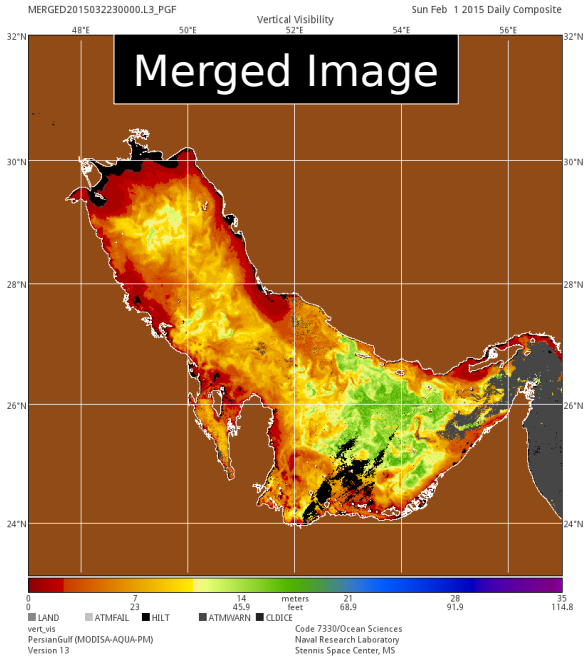
Example: Persian Gulf – February 01, 2015

Vertical Visibility : Good Agreement



@14 minutes apart



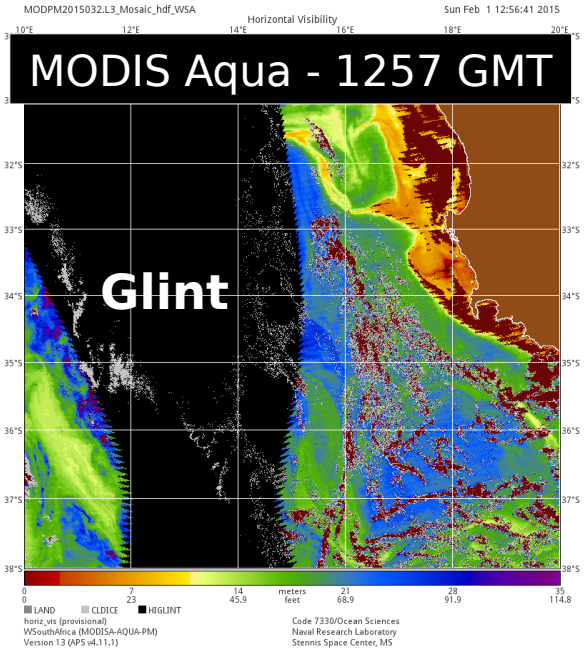


Implementation Complete
Delivered Q1FY15

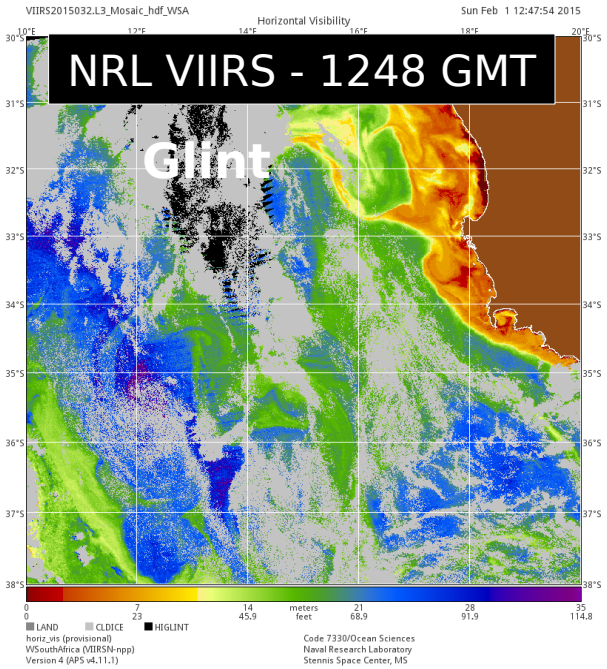
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

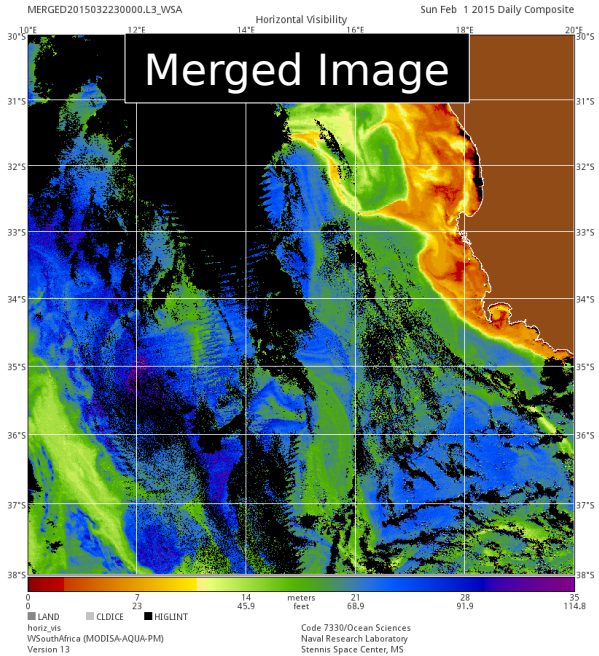
Example: Western South Africa – February 01, 2015

Horizontal Visibility : Good Agreement



@9 minutes apart



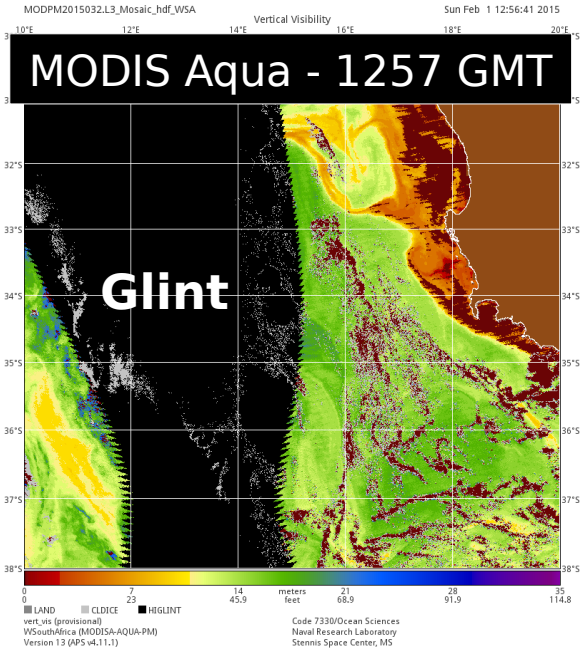


Implementation Complete
Delivered Q1FY15

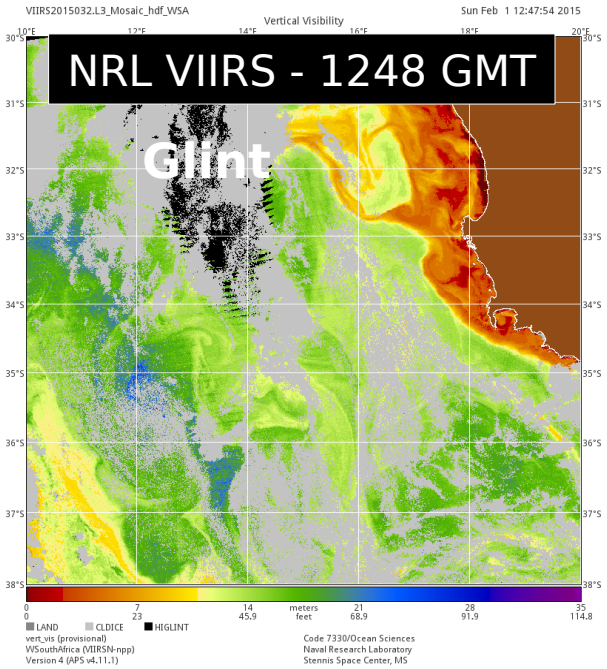
ew AOPS v4.12 Sensor Merge Capability for MODIS/VI

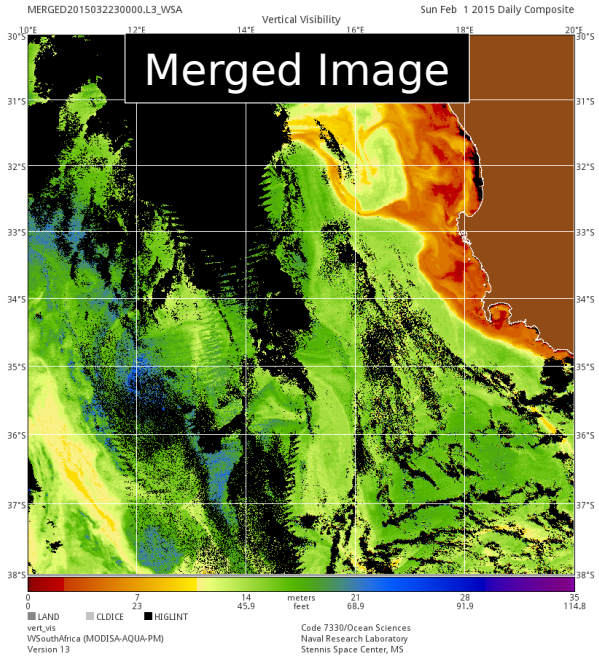
Example: Western South Africa – February 01, 2015

Vertical Visibility : Good Agreement



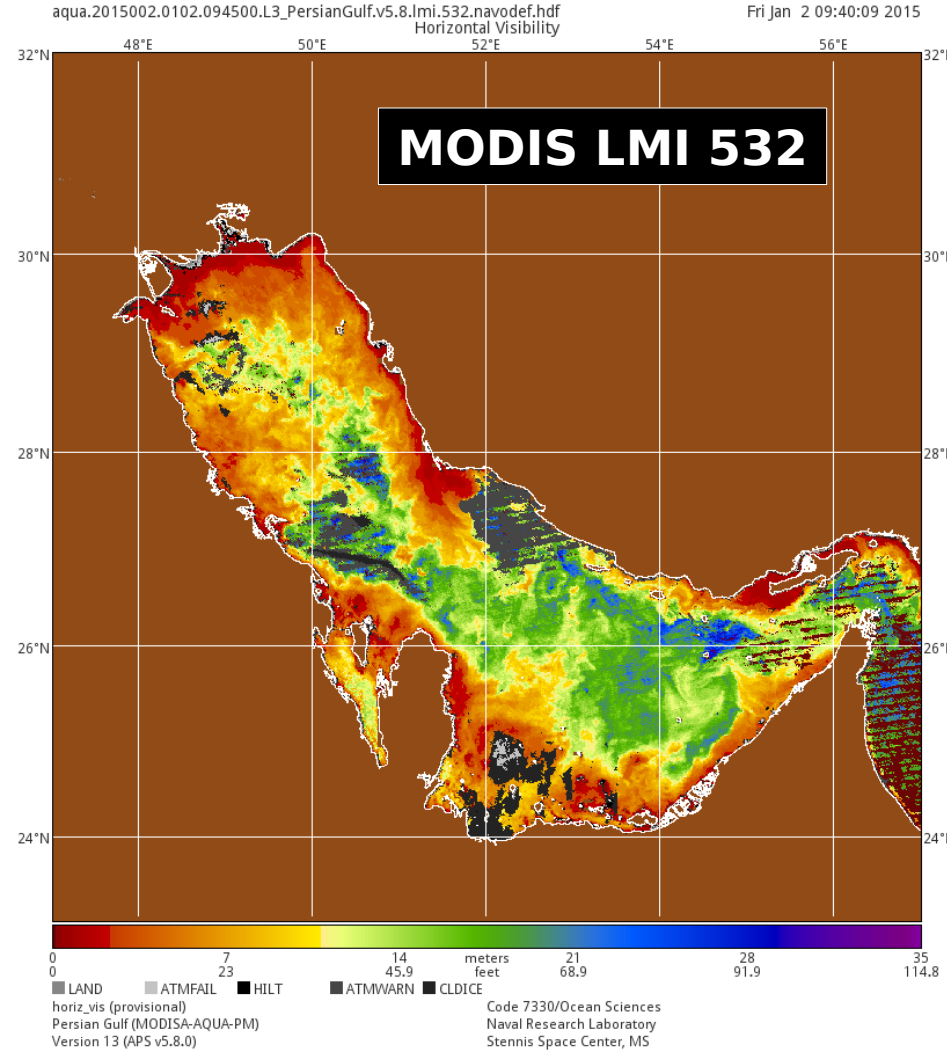
@9 minutes apart

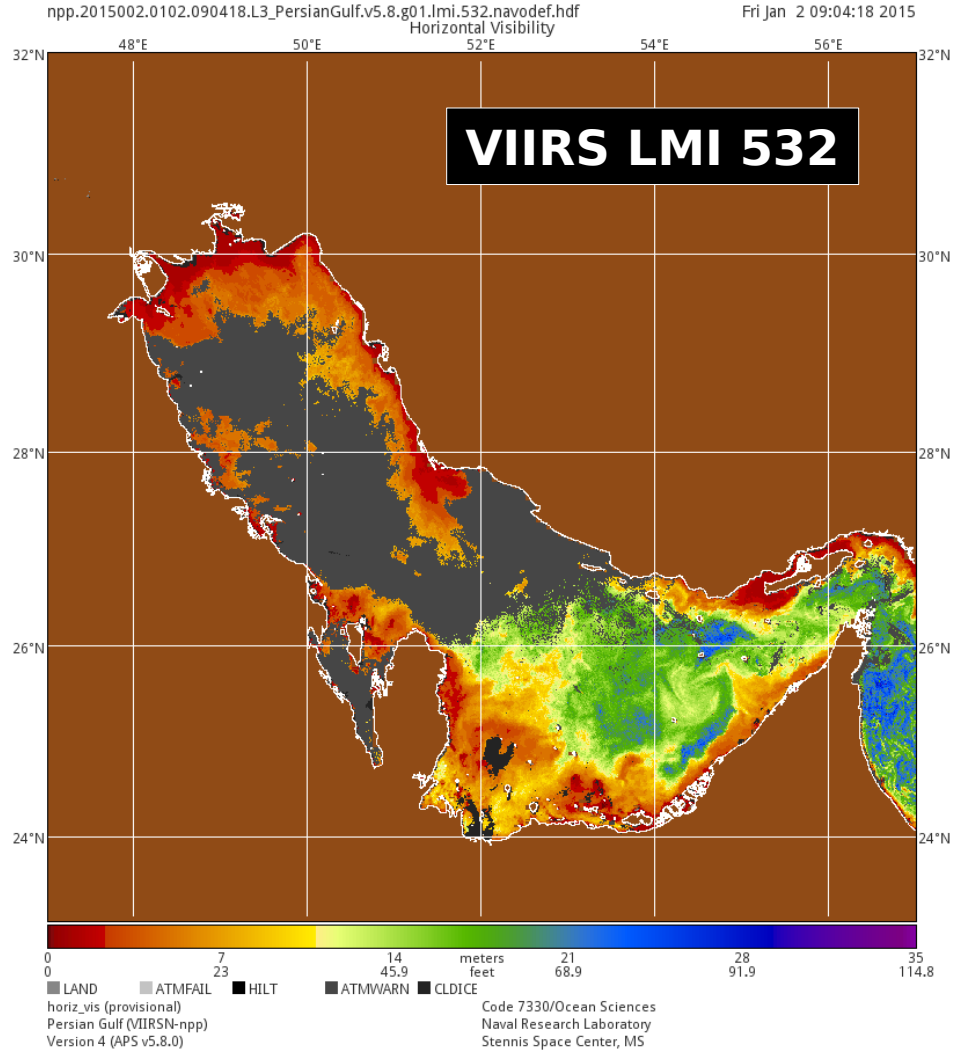




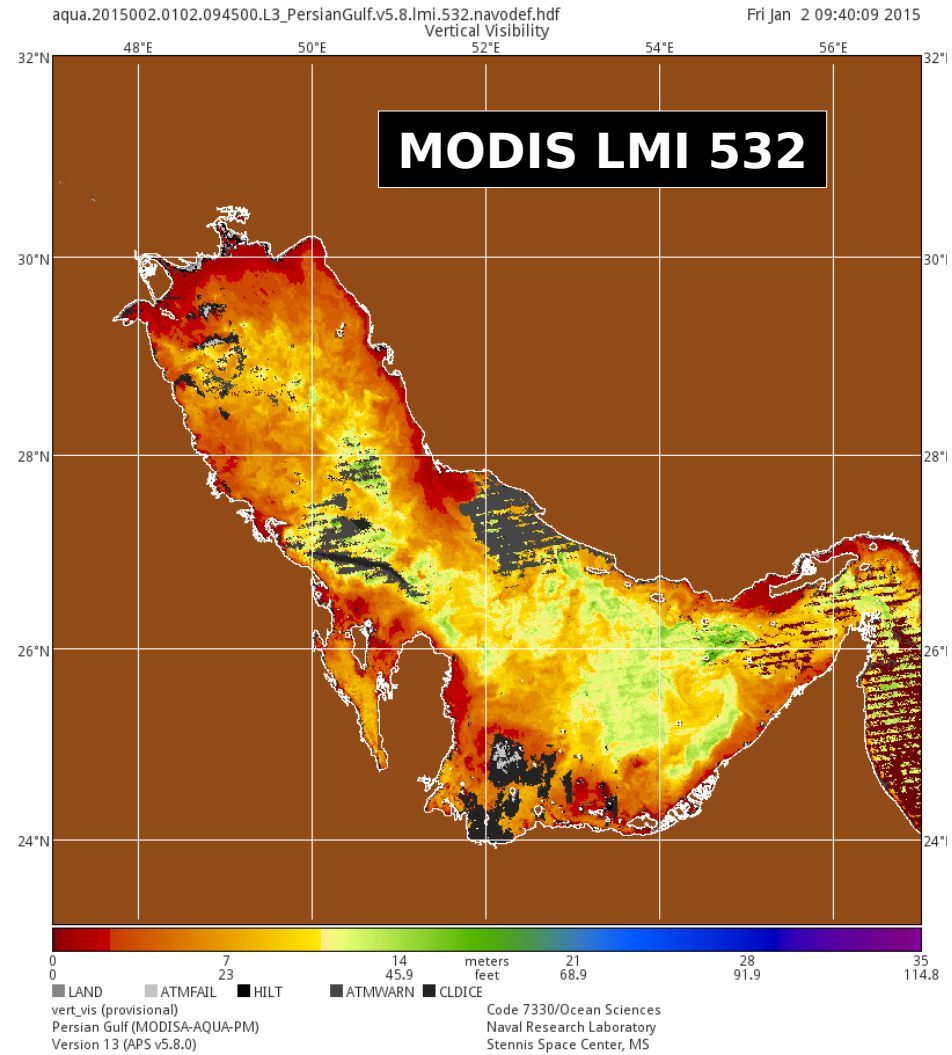
Implementation Complete
Delivered Q1FY15

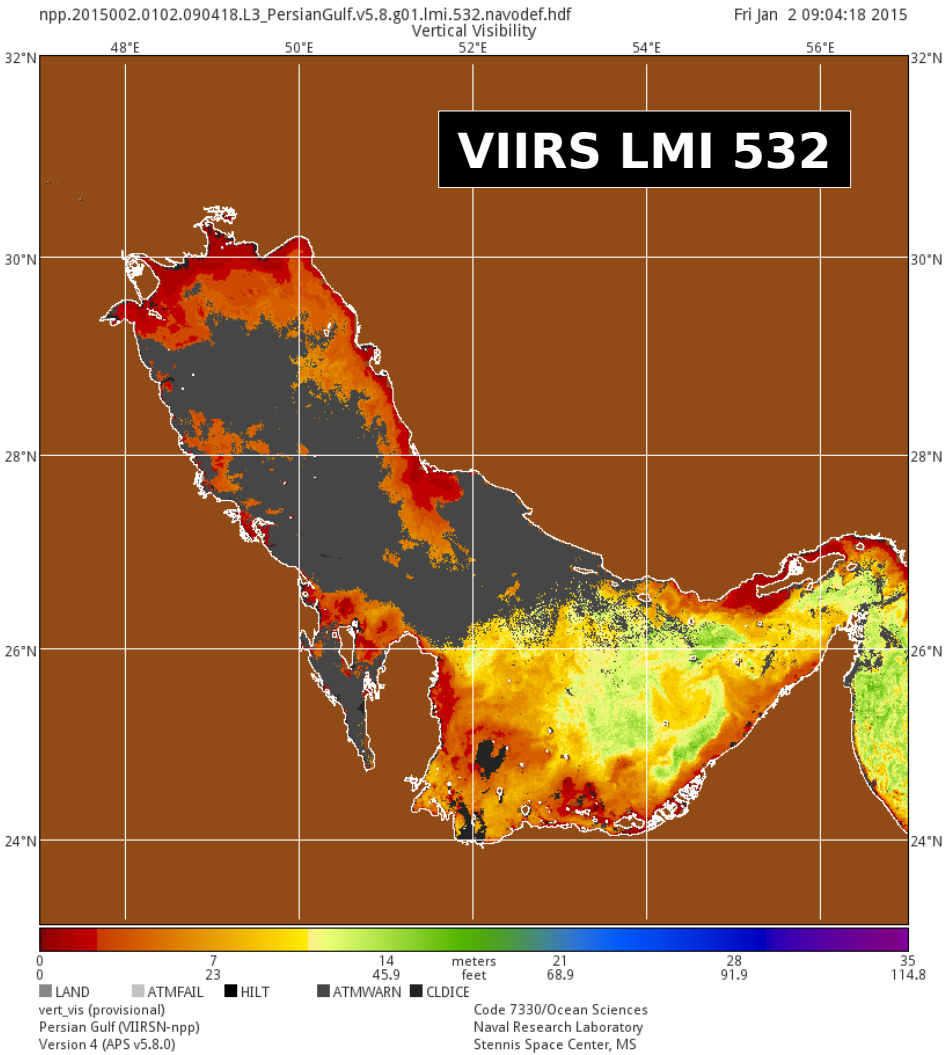
AOPS v4.12 – MODIS/VIIRS Comparisons
Persian Gulf
Jan. 02, 2015
Horizontal Visibility



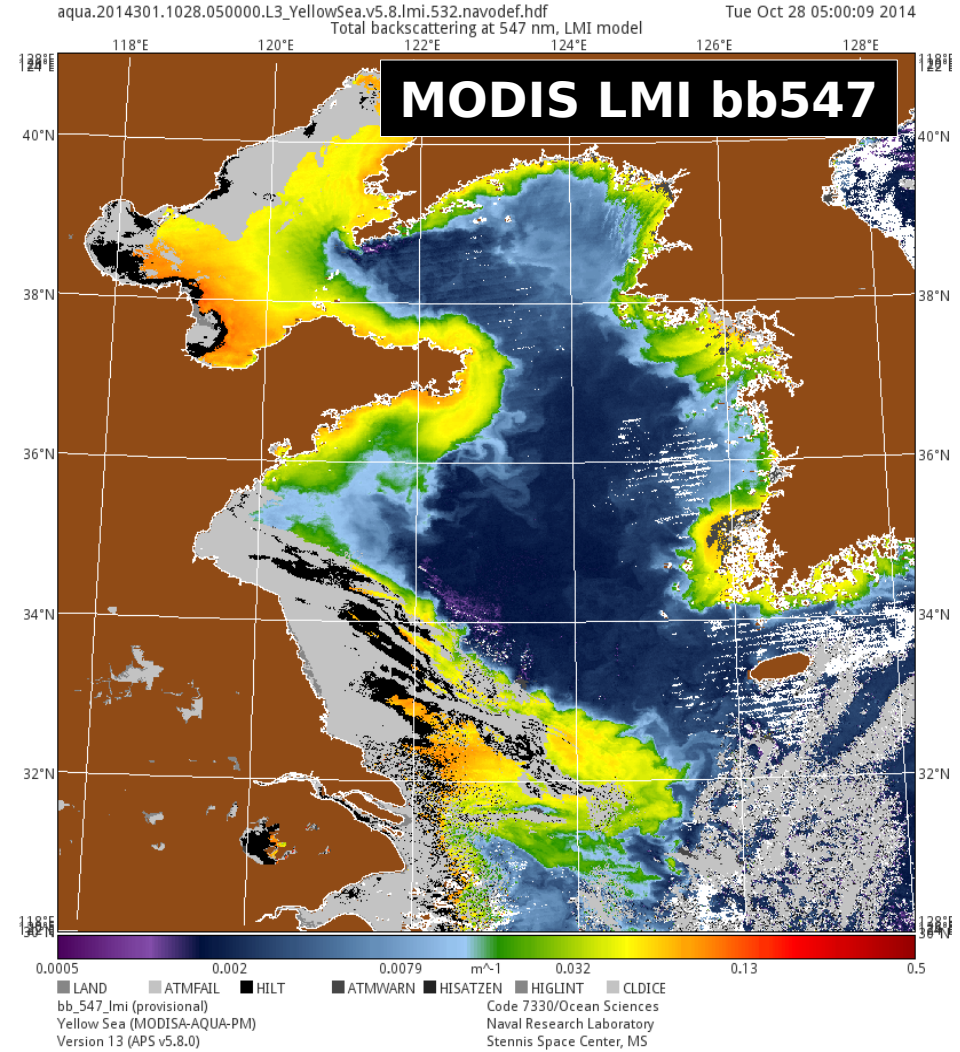


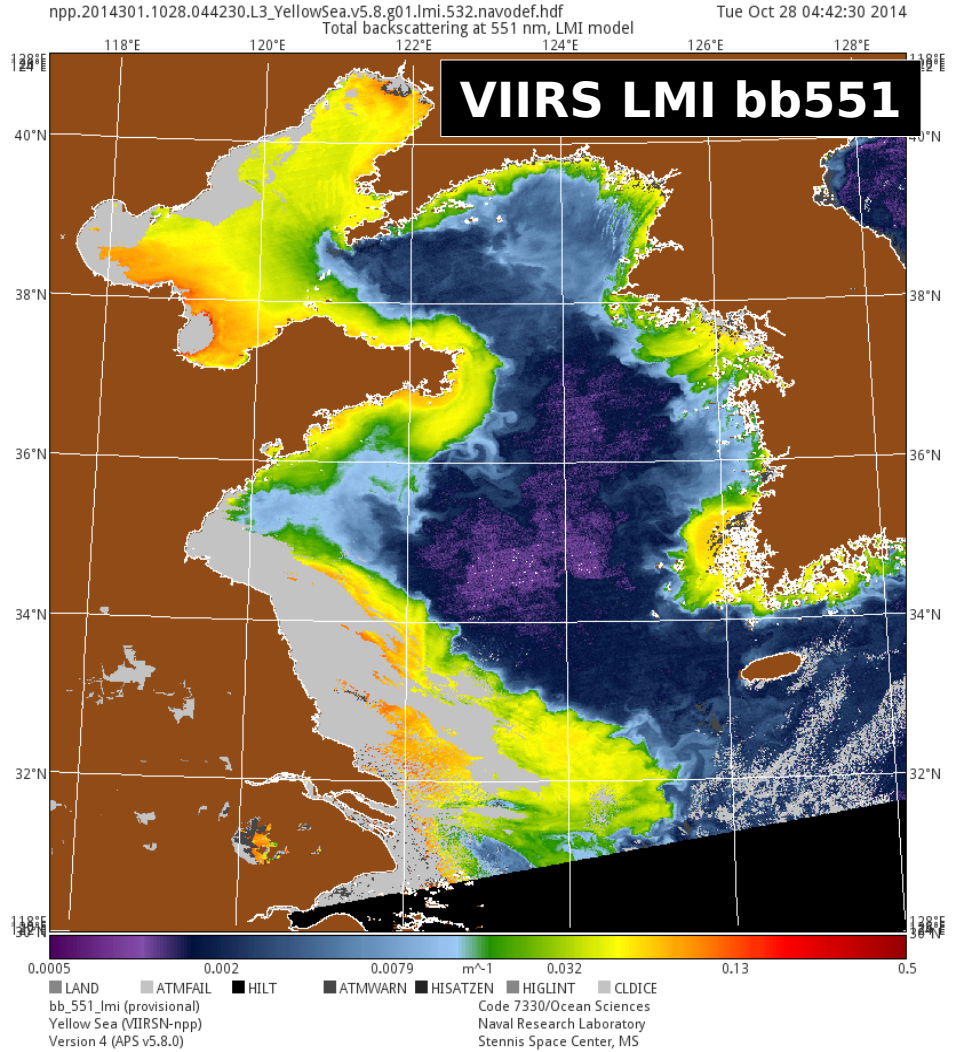
AOPS v4.12 – MODIS/VIIRS Comparisons
Persian Gulf
Jan. 02, 2015
Vertical Visibility



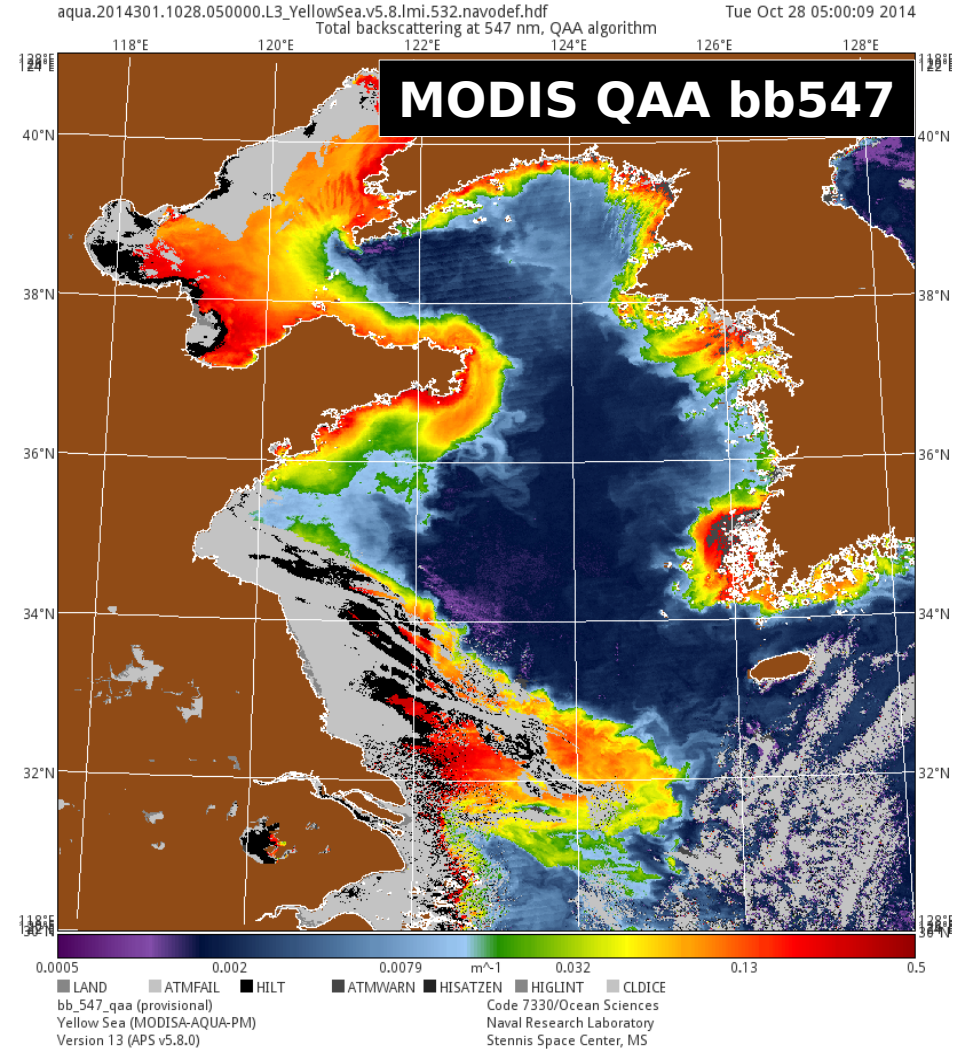


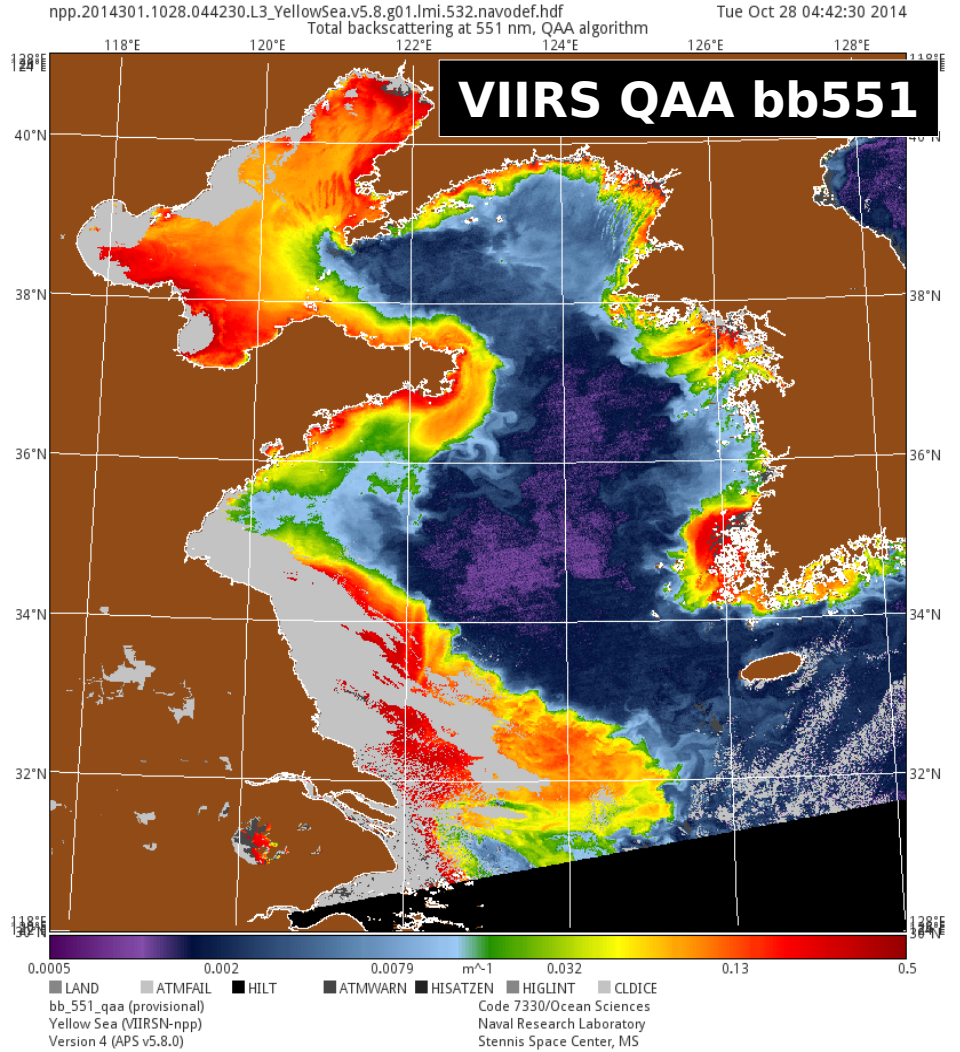
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
bb_551_lmi



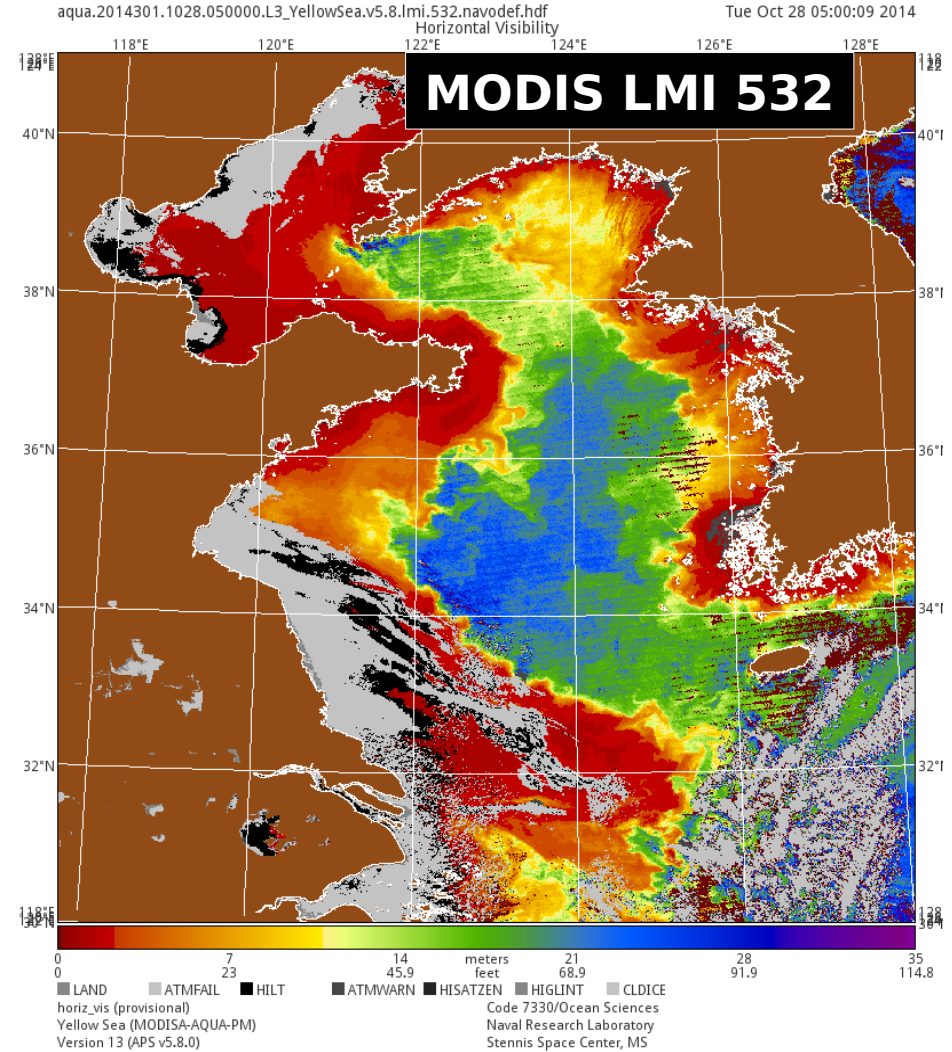


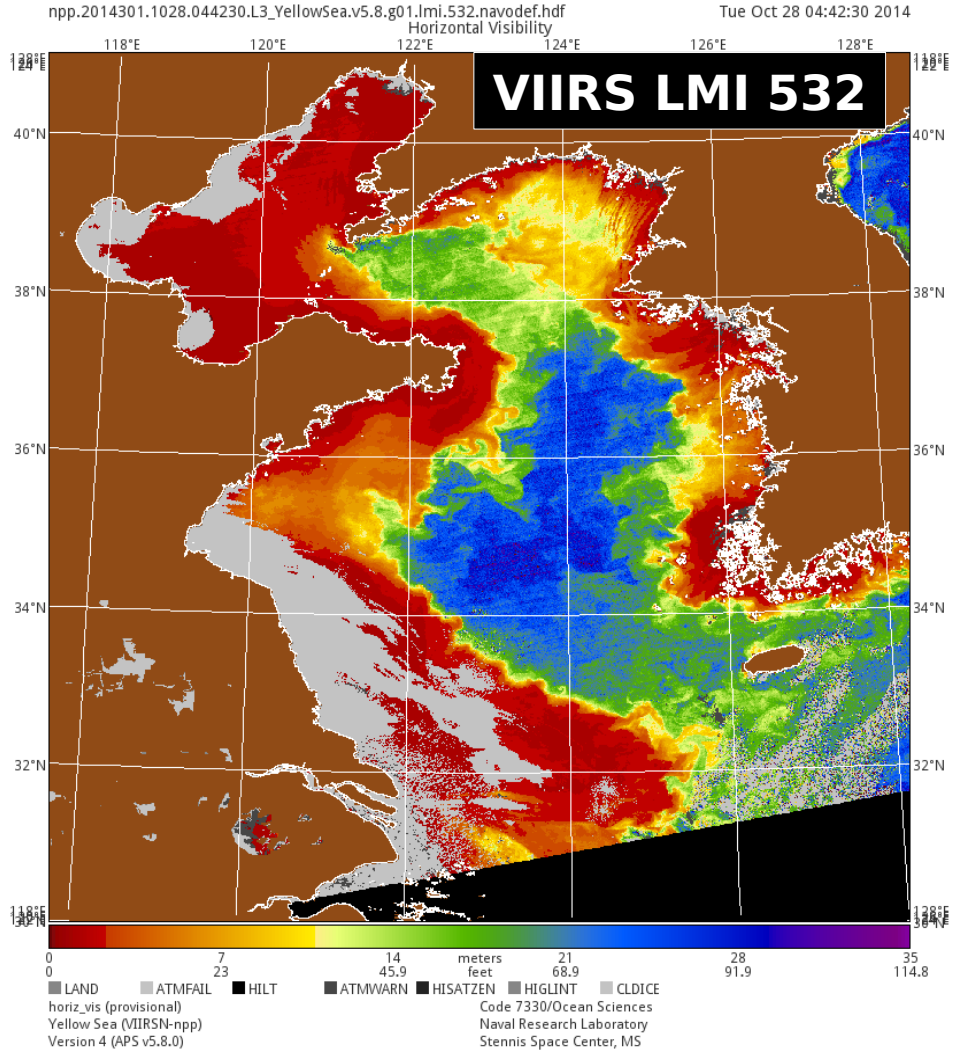
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
bb_551_ qaa



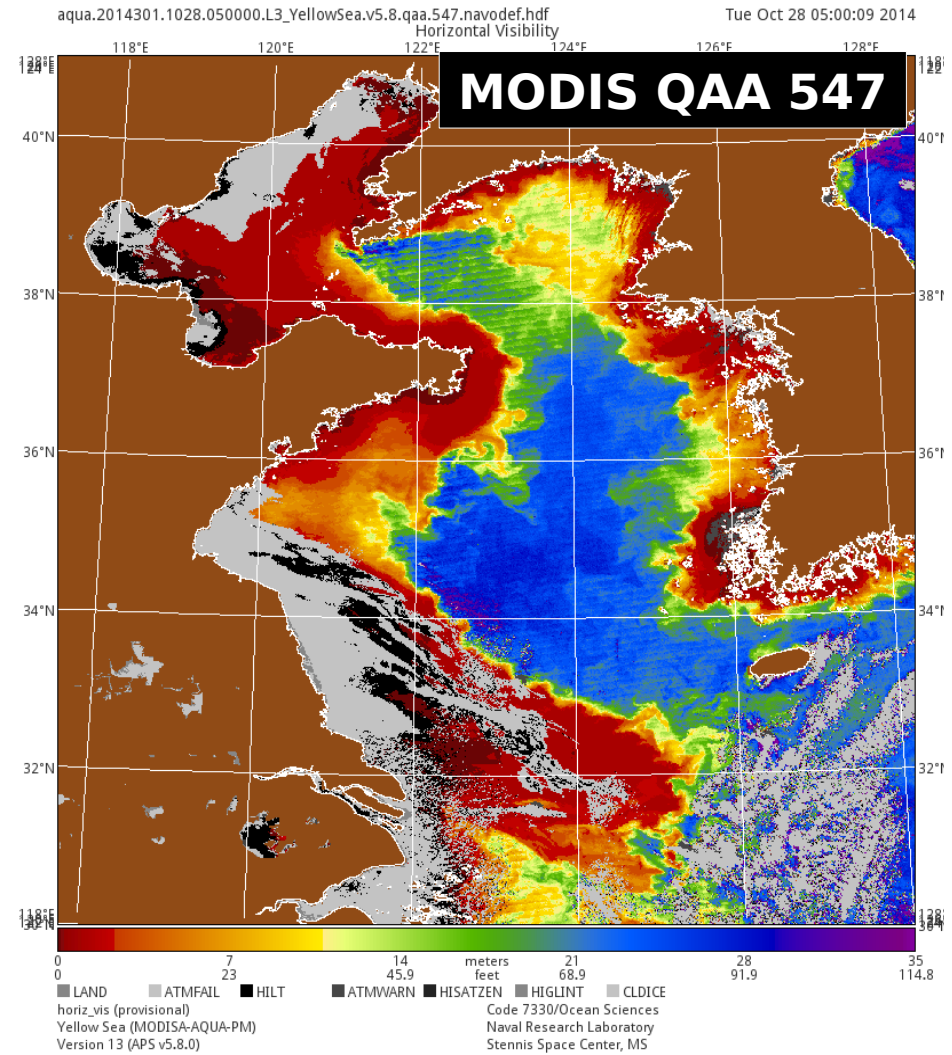


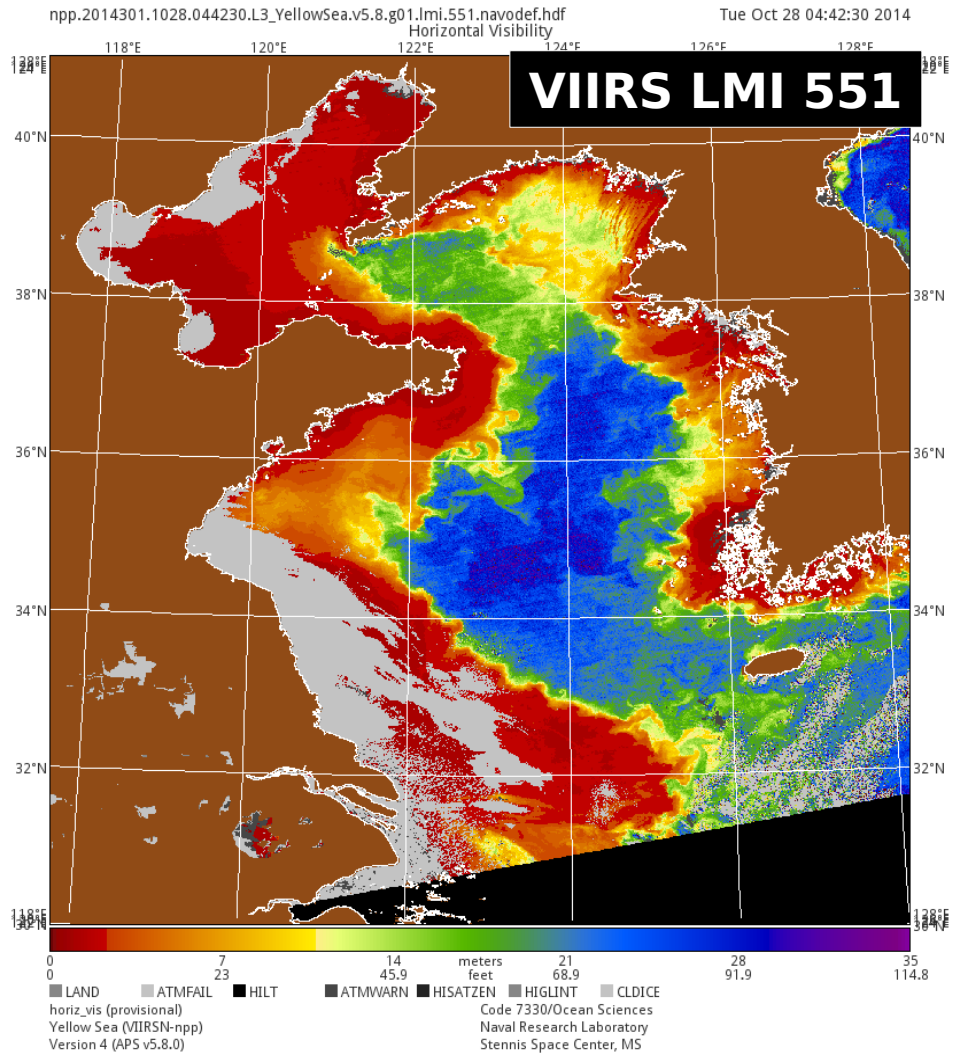
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
Horizontal Visibility



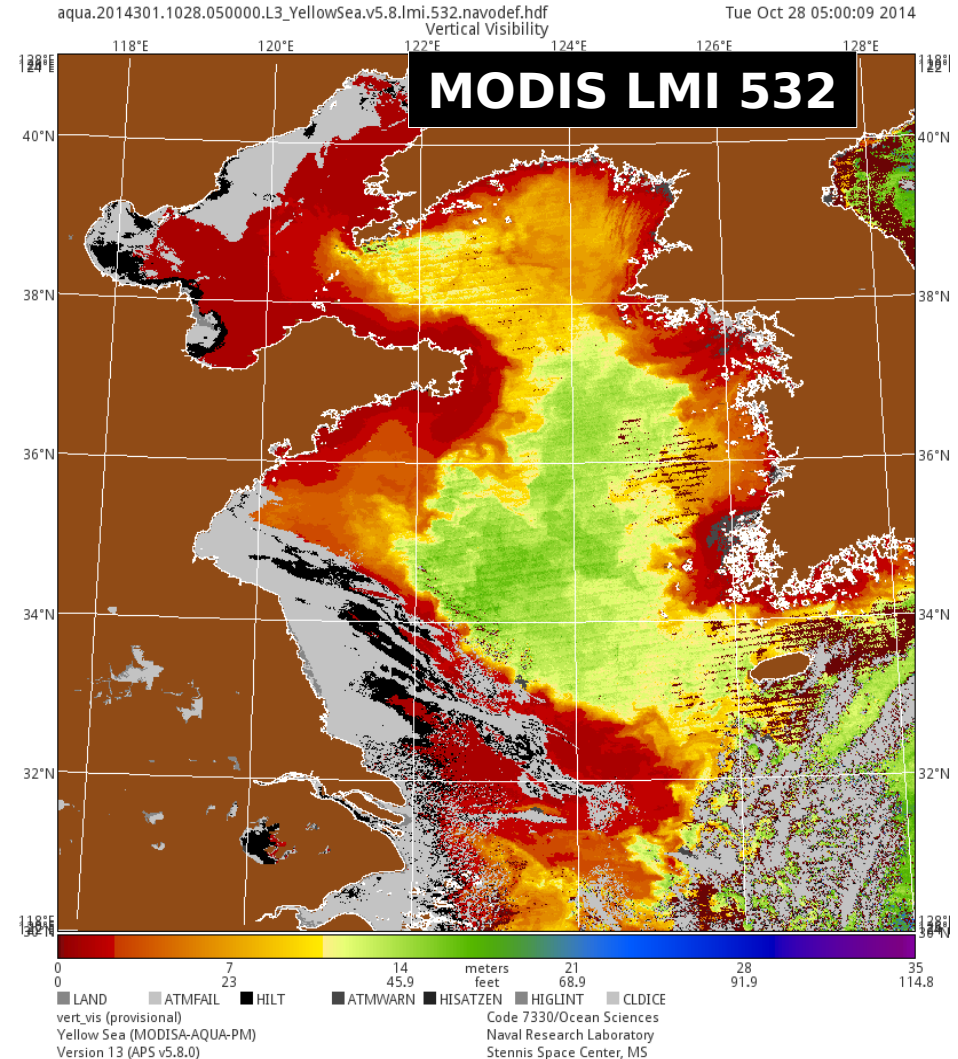


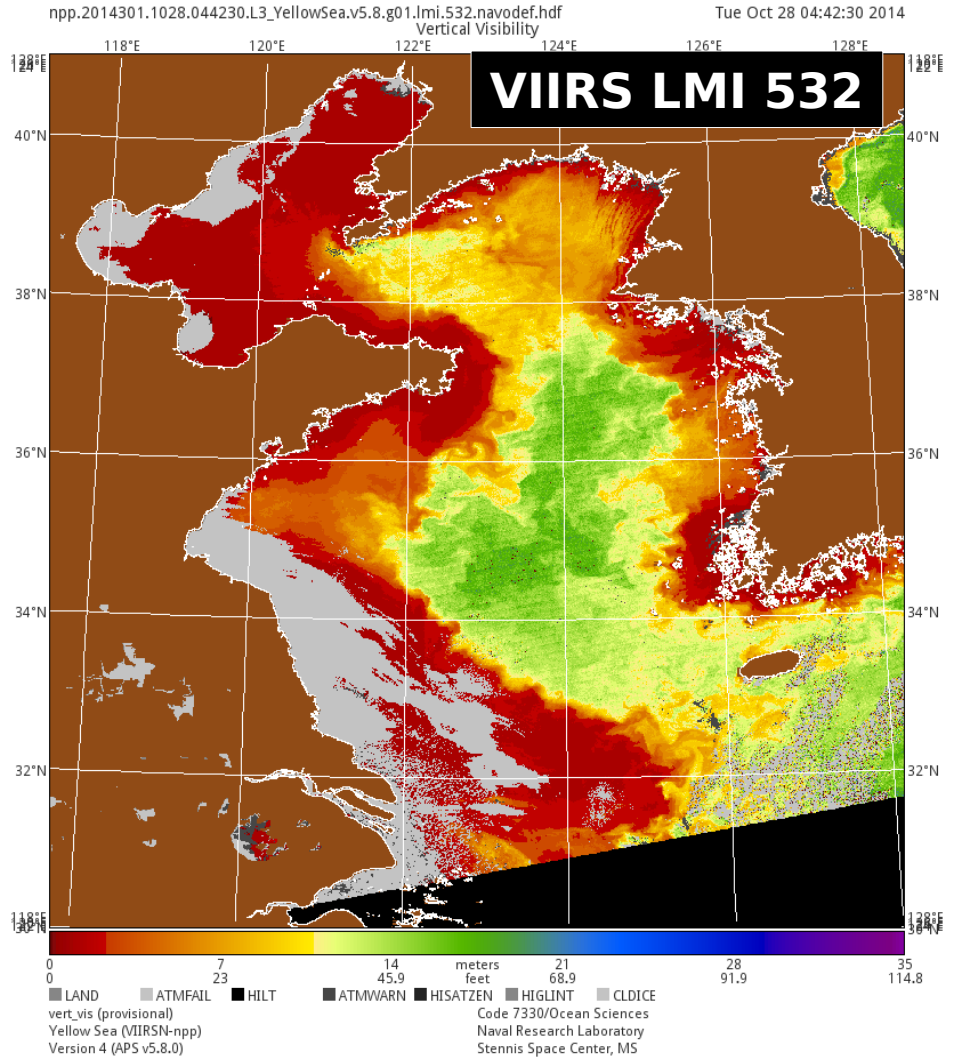
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
Horizontal Visibility



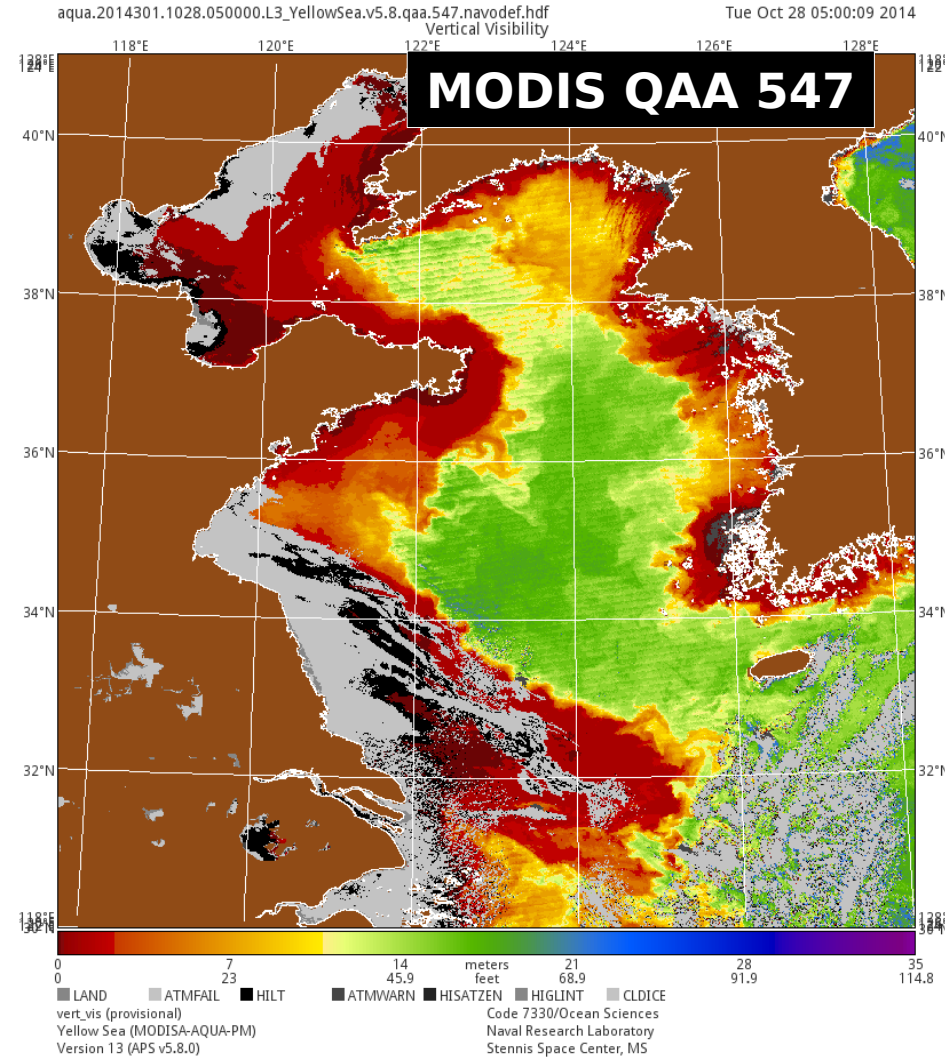


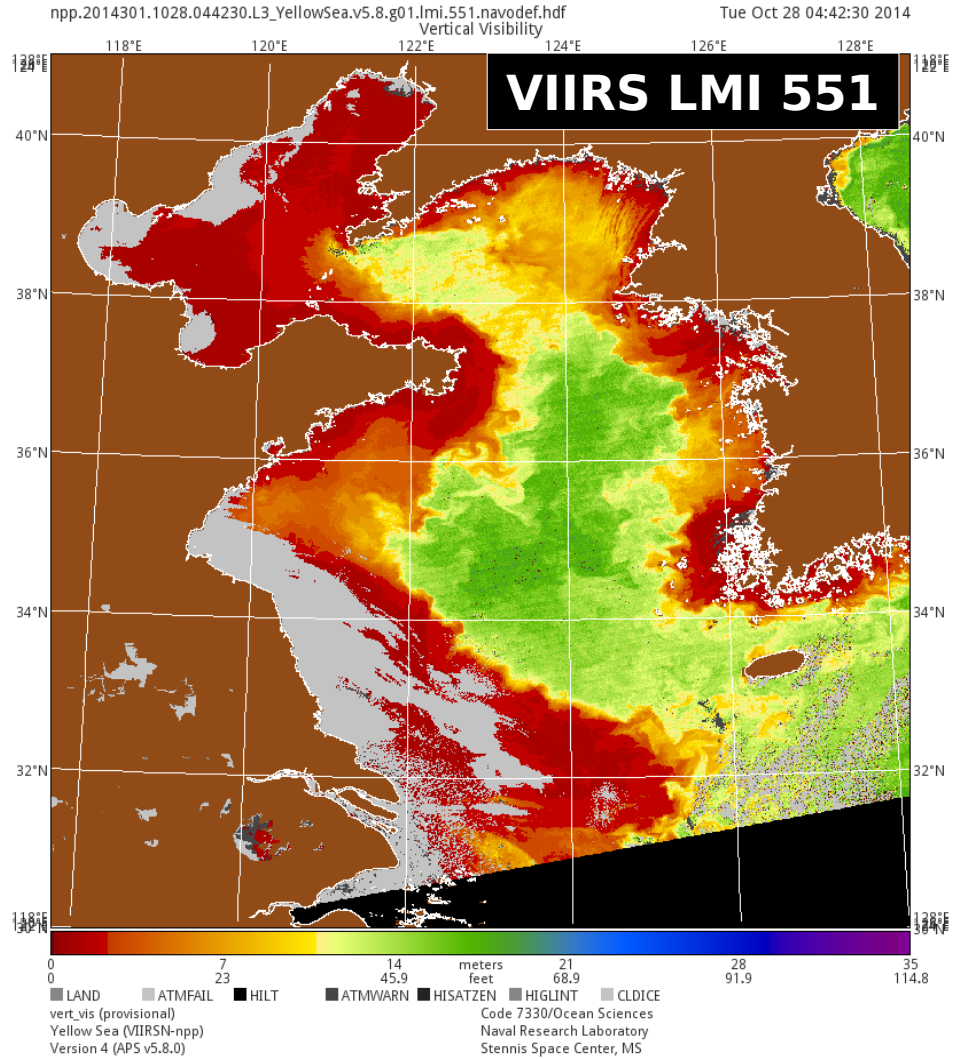
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
Vertical Visibility





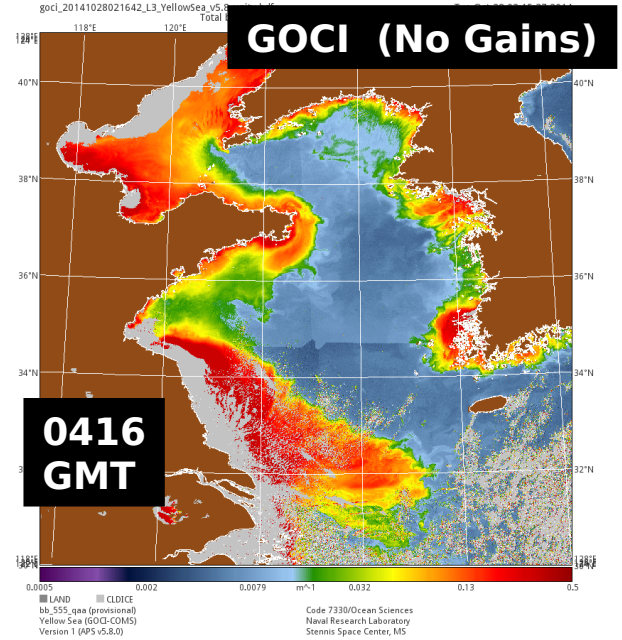
AOPS v4.12 – MODIS/VIIRS Comparisons
Yellow Sea
Oct. 28, 2014
Vertical Visibility

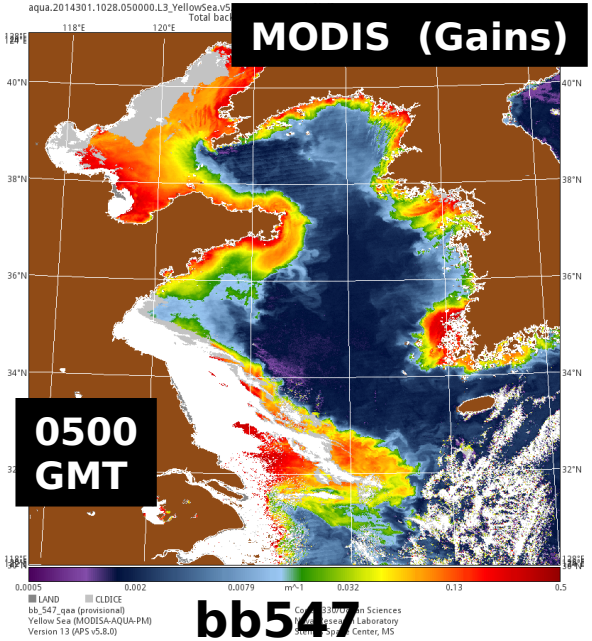




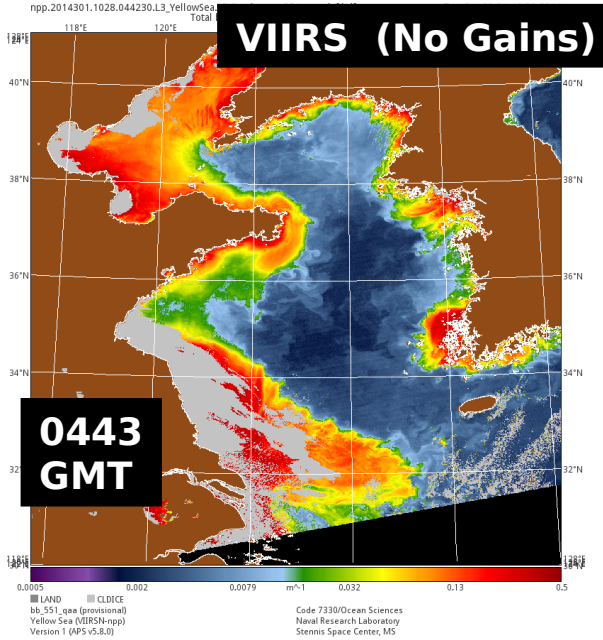
AOPS v4.12
ODIS/VIIRS/GOCI Comparison
Yellow Sea
Oct. 28, 2014
Orbit Calibration Improvemer
(Vicarious Calibration)

nter-Sensor Comparisons of Operational Optical Products with/without librations Applied - Yellow Sea – October 28, 2014 – Backscattering 555

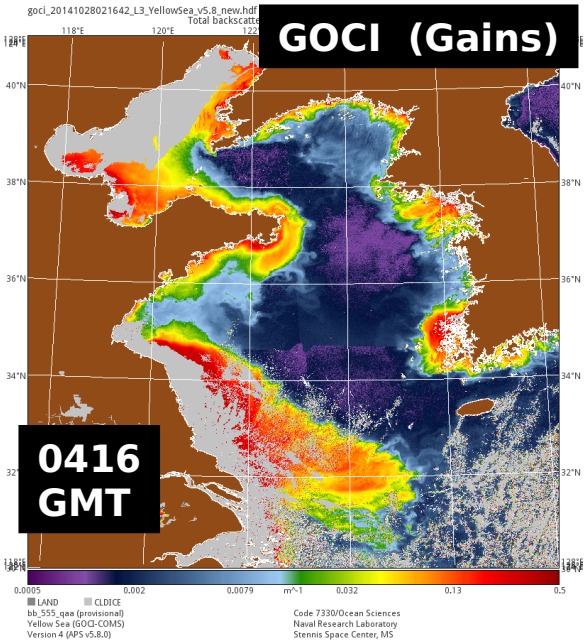


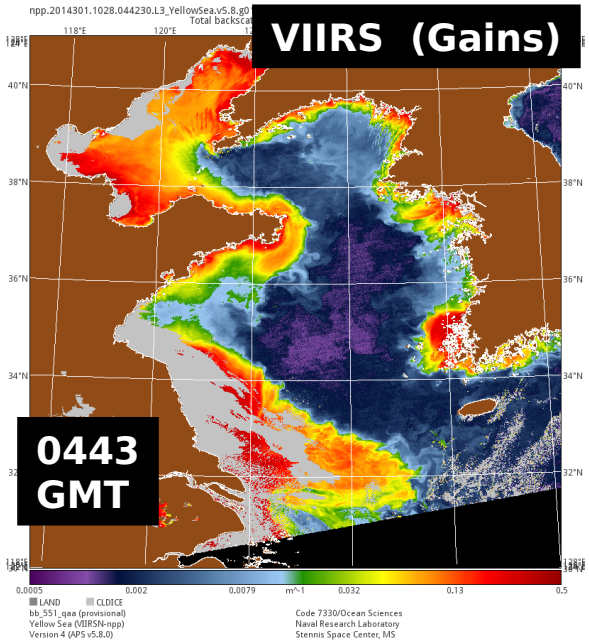


bb547



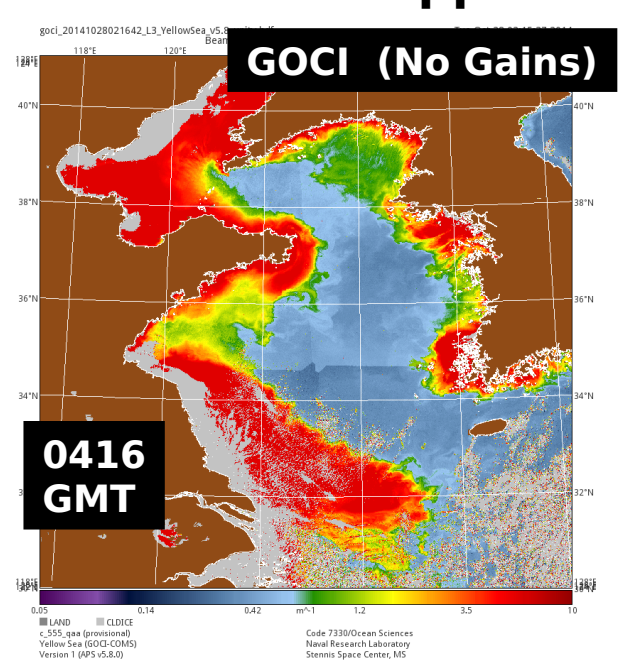
bb555

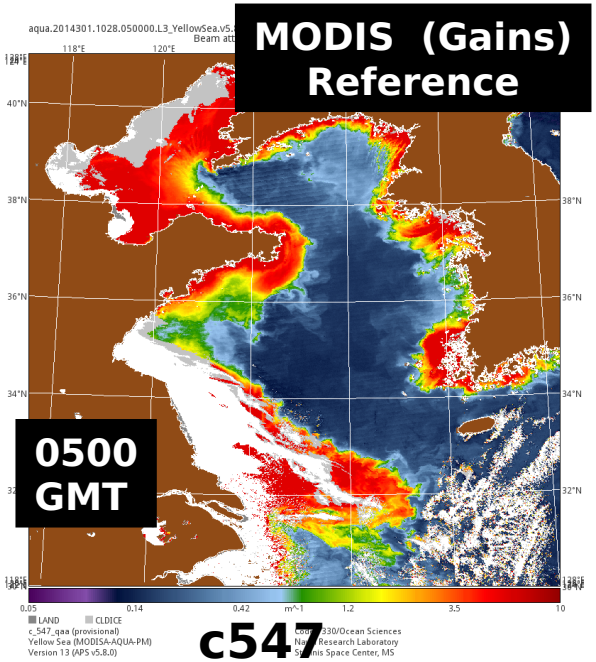




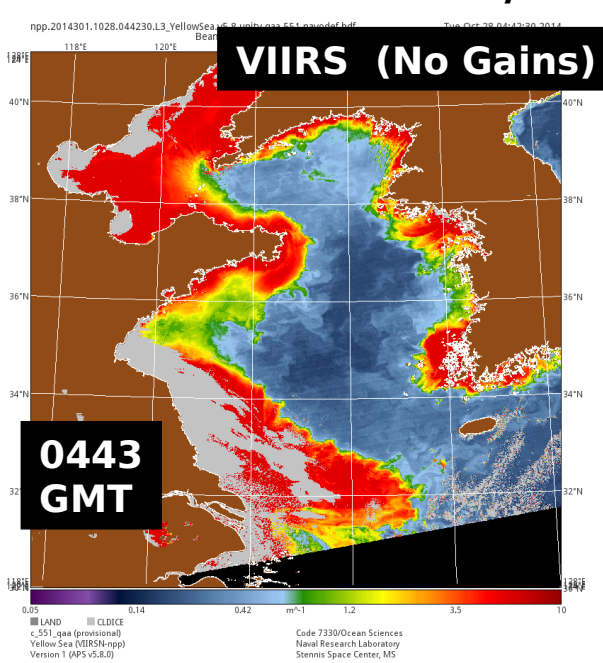
bb551

nter-Sensor Comparisons of Operational Optical Products with/without
s Calibrations Applied - Yellow Sea – October 28, 2014 – Beam c 555/547

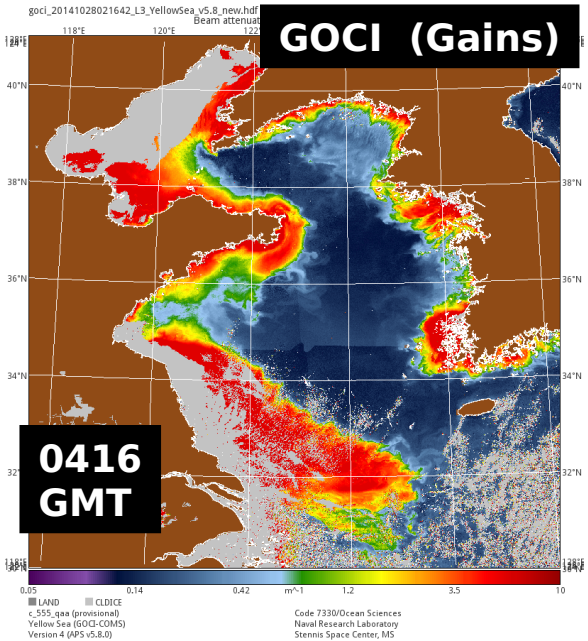


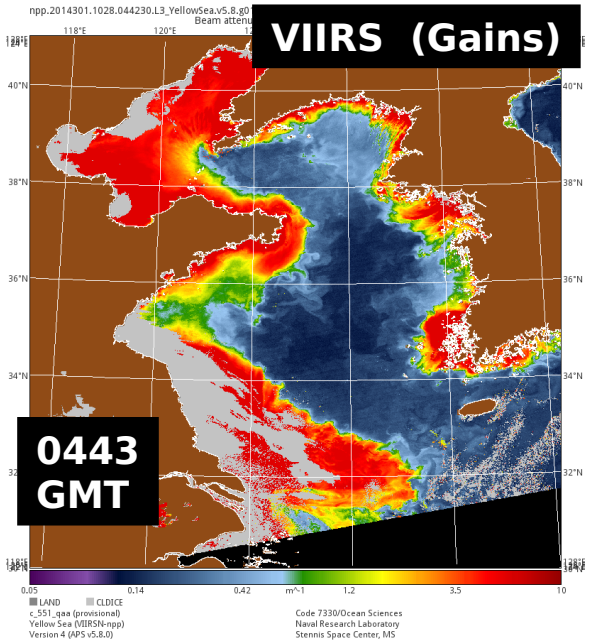


c547



c555





c551

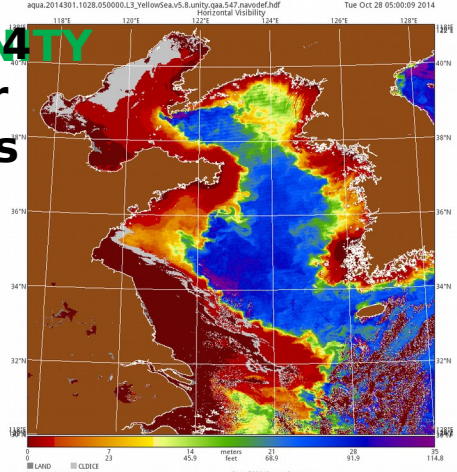
Oct. 28, 2014

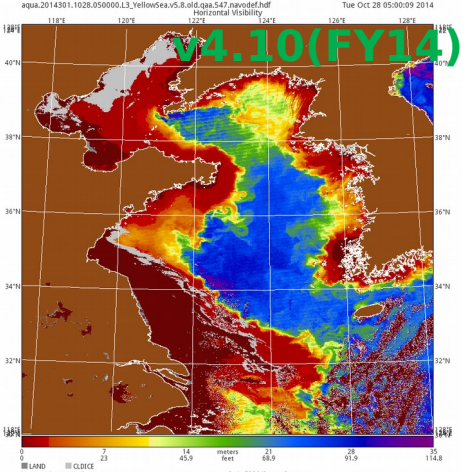
Inter-Sensor Comparisons

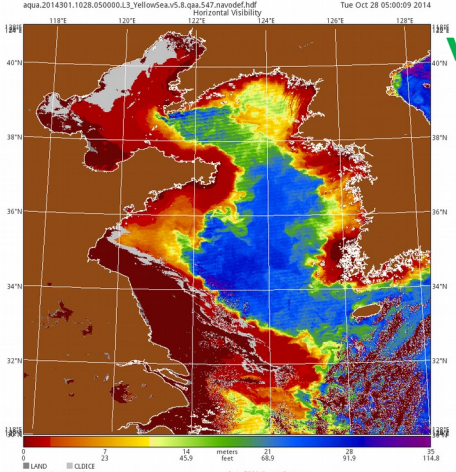
MODIS Aqua

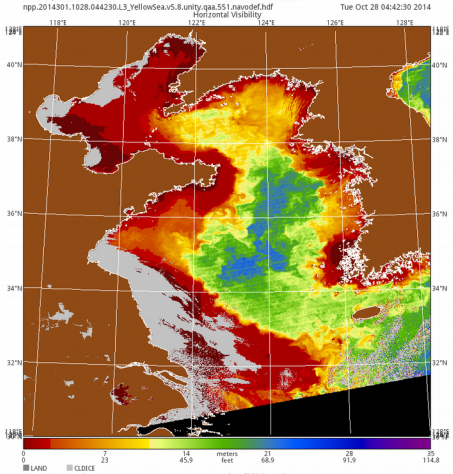
SNPP VIIRS

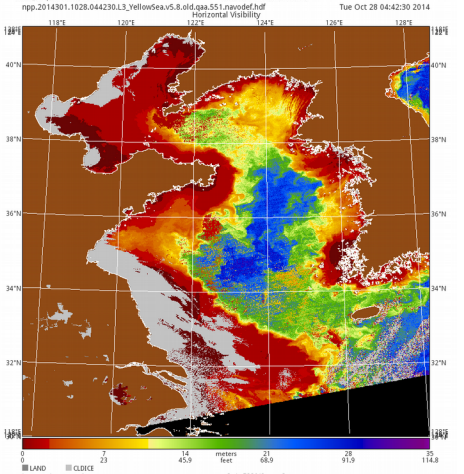
COMS GOCI

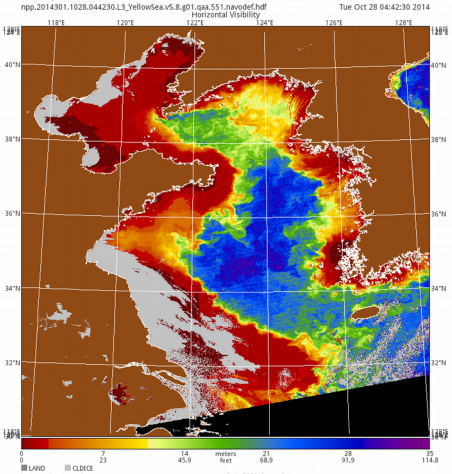


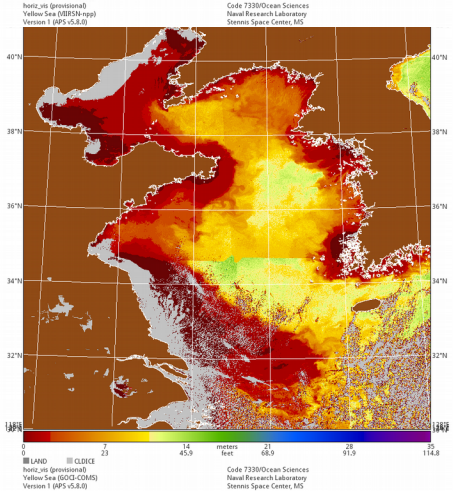


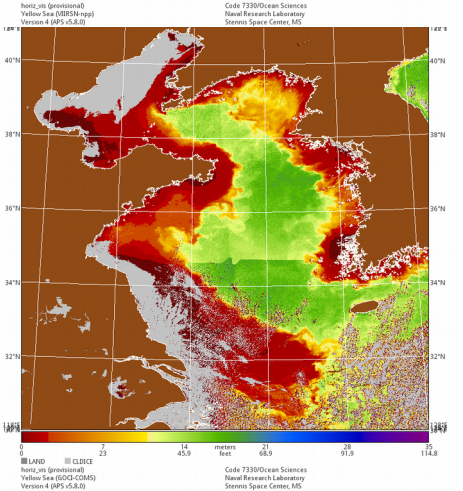


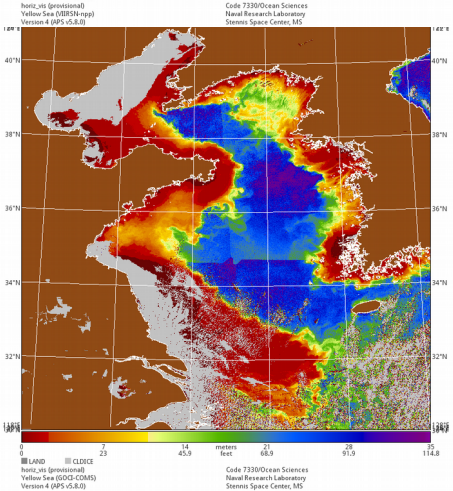












Summary

- VIIRS seems to be outperforming MODIS.
- VIIRS and MODIS optical and Navy algorithms are comparing very well. Better than ever.
- NRL AOPS inline with other organizations (NASA,NOAA)
- Vicals done for VIIRS, MODIS and GOCI
- Matchups w/ Aeronets and MOBY almost complete.
- Starting cruise matchups.
- Sensor Merge complete.
- High Res VIIRS being integrated into AOPS.
- Comparisons between MODIS, VIIRS and GOCI in Yellow Sea underway. Time series at a few selected points and image comparisons.
- VTR AOPS v4.12 outline created working on draft one.
- AOPS v4.12 delivered soon possibly without highres VIIRS initially.